

Service Manual

Color Television

CHASSIS : CM-500/500F

Model : DTU-29M5ME/MP/MT/MZ
 DTU-29M6ME/MP/MT/MZ
 DTU-29M7ME/MP/MT/MZ
 DTU-29U1ME/MP/MT/MZ
 DTU-29U5ME/MP/MT/MZ
 DTU-29U8ME/MP/MT/MZ
 DTU-29F1ME/MP/MT/MZ
 DTU-29F2ME/MP/MT/MZ
 DTU-29F3ME/MP/MT/MZ

MODEL OPTION LIST

MODEL	TEXT	PIP
ME	O	O
MP	X	O
MT	O	X
MZ	X	X

Caution

: In this Manual, some parts can be changed for improving. their performance without notice in the parts list. So, if you need the latest parts information, please refer to PPL(Parts Price List)in Service Information Center.



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1. SPECIFICATIONS

Items	Model	DTU-29M5ME/MP/MT/MZ DTU-29M6ME/MP/MT/MZ DTU-29M7ME/MP/MT/MZ DTU-29U1ME/MP/MT/MZ DTU-29U5ME/MP/MT/MZ DTU-29U8ME/MP/MT/MZ DTU-29F1ME/MP/MT/MZ DTU-29F2ME/MP/MT/MZ DTU-29F3ME/MP/MT/MZ
TV Standard	Color system	PAL/SECAM, NTSC-4.43(AV)
	Sound system	B/G, D/K, I, H
Rated Voltage		AC 110-250V, 50/60Hz
Power consumption		73W(FLAT:110W)
Sound Output Power		7W+7W (FLAT:7.5W + 7.5W at EQUILIZER CENTER)
Channel Conerage	VHF	BAND I : CH 02 ~ CH04(48.25MHz ~ 62.25MHz) BAND II : CH05 ~ CH12(175.25MHz ~ 224.25MHz) CABLE BAND : S01 ~ S03, (69.25MHz ~ 83.25MHz) S01 ~ S20, (105.25MHz ~ 294.25MHz) HYPER BAND : S21~S41(303.25 ~ 463.25MHz)
	UHF	BAND IV, V : CH21 ~ CH69(471.25MHz ~ 855.25MHz)
Tuning System		FS Tuning System
Program No. Indication		ON-Screen Display
Program Selection		200 Programs
Aux. Terminal		AV1 input <RCA : input, Scart(Optional): input, Output> AV2 input <SIDE> (Model for 29U8 Serieese: FRONT) DVD1, DVD2 OUTPUT<OPTION:TV OUT or Monitor OUT>
Remote Control Unit		R-49C07
Screen size		67.6Cm

2 SAFETY INSTRUCTION

2 SAFETY INSTRUCTION

NOTE : BEFORE SERVICING THIS CHASSIS READ THE “X-RAY RADIATION PRECAUTIONS”, “SAFETY PRECAUTIONS” AND “PRODUCT SAFETY NOTICE” BELOW.


X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 25.6KV [Normal Type](27.9KV [Flat Type]) at max beam current. The high voltage must not, under any circumstances, exceed 28.6KV [Normal Type] (30.9KV [Flat Type]). Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY Radiation in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

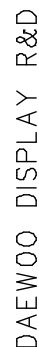
SAFETY PRECAUTION

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back cover removed involves a shock hazard from the receiver.
 - 1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
 - 2) Always discharge the picture tube to avoid the shock hazard before removing the anode cap.
 - 3) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a high wattage resistor (metal oxide film resistor) in the circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate between AC 110-250 volts, 50/60Hz. NEVER connect to DC supply or any other power or frequency.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this equipment have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol ‘’ on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY Radiation.

CM-500/F CHASSIS BLOCK DIAGRAM



4. ALIGNMENT INSTRUCTIONS

DOCUMENT HISTORY

VERSION	DATE	COMMENTS
V0.00	26/10/04	Document imported from project Cp520(Author J.D.Santos)
V1.00	12/11/04	Major revision after visit in Gunpo RND
V1.01	25/11/04	Tuner option revision(Byte1, bite2,1,0)
V1.02	29/11/04	Curtain beep option added(Byte3, bits1)
		Curtain ON/OFF bit setting corrected
V1.03	02/12/04	Local key option bit changed.
		Digital eye levels added
V1.04	17/12/04	Local keyboard option 01 changed
V1.05	20/01/05	AV stereo and Koran options added
V1.06	16/02/05	Default setting in case of virgin EEPROM changed

ALIGNMENT INSTRUCTIONS

4.1 MICROCONTROLLER CONFIGURATION : SERVICE MODE

To switch the TV set into service mode please see instruction below.

- 1 - Select PR. number 91
- 2 - Adjust sharpness to minimum and exit all menus.
- 3 - Within 2 seconds press the key sequence : **RED - GREEN - menu**

The software version is displayed beside the word Service, e.g. "SERVICE V1.00".

To exit SERVICE menu press menu key or **Stand By** key.

4.2 SERVICE MODE NAVIGATION

Pr Up/Down remote keys : cycle through the service items available.

Vol +/- remote keys : Dec./Increment the values within range - Cycle through option bits.

OK key : Toggle bits in option byte

Order	Item	Default setting
1	HOR CEN	
2	RED GAIN	
3	GRN GAIN	
4	BLUE GAIN	
5	RED BIAS	
6	GRN BIAS	
7	AGC LEVEL	
8	G2 - SCREEN	
9	OPTION1	
10	OPTION2	
11	OPTION3	
12	V. LINEAR	
13	V. SLOPE	
14	S. CORRECT	
15	VERT CENT	
16	VERT SIZE	
17	BRIGHTNESS	
18	SHIPPING	

ALIGNMENT INSTRUCTIONS

1 CONTROL BITS

There are two option bytes available (16 bits in all). These option bits are available from FACTORY and SERVICE mode. First find the OPTION1, OPTION2 or OPTION3 control, and then use the UP/DOWN and PLUS/MINUS keys on the relevant remote keypad to control the bits.

The table below shows the three option bytes available.

Default setting in case of virgin EEPROM are shown in light grey.

4.3.1 OPTION1

	B7	B6	B5	B4	B3	B2	B1	B0
1	TOP Teletext OFF	FASTEXT (FLOF) OFF	TUBE 4:3	Teletext ON	Dolby Virtual OFF	TUNER OPTIONS (see table below)		
0	TOP Teletext ON	FASTEXT (FLOF) ON	TUBE 16:9	Teletext OFF	Dolby Virtual ON			

4.3.2 OPTION2

	B7	B6	B5	B4	B3	B2	B1	B0
1	Fixed to '0'	NEC remote control	AV out: monitor	Koran functions enabled	Local key option (see table below)		Digital eye disabled	PARS logo OFF
0		Daewoo Remote control	AV out: Tuner	Koran functions enabled			Digital eye enabled	ON

4.3.3 OPTION3

	B7	B6	B5	B4	B3	B2	B1	B0
1	Curtain OFF	Teletext language table			Chassis with E/W correction circuit	PIP OFF	Beep at curtain opening: OFF	Full stereo
0	Curtain On				Chassis with out E/W correction circuit	PIP ON	Beep at curtain opening: ON	AV Stereo only

ALIGNMENT INSTRUCTIONS

4.4 USER GUIDE

4.4.1 ENTERING FACTORY MODE

To switch the TV set into FACTORY mode, use the factory remote control, and press on "SVC". The factory menu will appear on the screen, showing "FACTORY Vx,xx"(where x.xx is the software version).

4.4.2 ENTERING OPTION BITS MENU

To find the option bits, push the button "OPT" once. To find OPTION2 press the button "OPT" a second time.

4.4.3 SELECTING OPTION BITS

From left to right, bits 7 to 0 are shown. Navigation is done from the with FACTORY remocon with the VOL MIN and VOL MAX buttons(otherwise known as EAST, WEST). The selected bit is highlighted.

4.4.4 TOGGLING OPTION BITS

This is done by using the PR UP and PR DOWN button (otherwise known as NORTH, SOUTH).

4.4.5 EXTING OPTION BITS MENU

Push the button "OPT" a third time. The full sequence enter to exit is;
FACTORY -> OPTION1 -> OPTION2 -> OPTION3 -> FACTORY

4.4.6 AFTER SETTING OPTION BITS

Before pushing on the shipping key, "BRI.", it is necessary to push the "NORMAL" key to obtain NORMAL I. This will reset all the sound and brightness settings to a factory defined level, as well as some other settings such as sound PRESET and WAKE TIME/PROG.

Then, on pushing the shipping key, thess levels are memorised in the television, ready for packing and delivery.

4.4.7 VERIFICATION

On pushing the shipping "BRI." key, a four digit hexadecimal number is displayed in addition to "SHIPPING". This number is there to verify the option bits setting that has been entered. For example the binary code 1001 1111(OPTION3) 0000 0111(OPTION2) 1100 0010(OPTION1) will give 9F 07 C2 hex. The order of display is therefore OPTION3, OPTION2 then OPTION1 when reading from left to right.

ALIGNMENT INSTRUCTIONS

4.5 CONTROL DESCRIPTION

4.5.1 OPTION 1 BITS

- TOP Teletext(Bit 7)

Enables/disables the TV from displaying TOP row 24 link titles, and the dedicated TOP menu table. A FLOF (if available) or SIMPLE / PAGETRACE presentation will be used.

- FLOF/Fastext (Bit 6)

Enables/disables the TV from displaying FLOF row 24 link titles. A TOP(if available) or SIMPLE/PAGETRACE presentation will be used.

- Tube(Bit 5)

Define as 4:3 or 16:9 tube. This will permit the ZOOM function to understand the formats that should be available.

- Teletext ON/OFF(Bit 4)

Enables/disables the Teletext on TV. If Teletext is disabled, user can not select clock prog and zoom selection in features menu. WSS is also disabled.

- Dolby Virtual(Bit 3)

Allows Doby Virtual (trademark) 3D effect to be available from the user control(button "3D").

Note : Dolby Virtual is only available with some UOC reference.

- Tuner(Bits 2,1 & 0)

Configures the software to communicate with the tuner via i2c bus. Incorrect configuration may not be immediately obvious, but will result in loss of functionality (e.g. unable to tune UHF

Bit2	Bit1	Bit0	LAN	Tuner
0	0	0	No	Philips (external AGC)
0	0	1	No	Philips (internal AGC)
0	1	0	No	Alps
0	1	1	No	Partsnic or Samsung
1	0	0	Yes	Philips UV1356A MK3 (external AGC)
1	0	1	Yes	Philips UV1356A MK3 (internal AGC)

channels, unable to tune some hyperband channels).

See also NVM mapping to configure parameters for automatic AGC adjustment when external AGC is used. When internal AGC is used, the TOP is stored in NVM.

ALIGNMENT INSTRUCTIONS

4.5.2 OPTION 2 BITS

- Remote control(Bit 7)

This is not intended to be changed by use of the FACTORY remote control.

- NEC/Daewoo Remocon(Bit 6)

User remote control configuration, the choice being between the following;

- NEC remocon('1')

- Daewoo R-49C07('0')

The R-30SVC7 "FACTORY" remote control will never be affected by this setting.

- Local keyboard option (Bit 3 & 2)

	11	10	01	00
0 mV ~ 220 mV	Not used	Menu	Menu	
22 mV ~ 620 mV	(TV/AV) Menu	TV/AV	Prog. Up	
620 mV ~ 1.06 V	Vol. Up	Vol. Dwn	Prog. Dwn	Not used
1.06 V ~ 1.48 V	Vol. Dwn	Vol. Up	Vol. Up	
1.48 V ~ 1.79 V	Prog.Up	Prog. Dwn	Vol. Dwn	
1.79 V ~ 2.07 V	Prog.Dwn	Prog. Up	TV/AV	

- Digital eye ON/OFF(Bit 1)

Enables/disables the digital eye function.

When enabled and selected, the microcontroller measures DC level on IC pin 15, and adjusts picture setting according to the table below.

	Brightness	Contast	Colour	Sharpness
0 mV ~ 450 mV	18	30	28	27
450 mV ~ 900 mV	28	46	28	29
900 mV ~ 1.35 V	30	50	29	30
1.35 V ~ 1.80 V	32	55	30	31
1.80 V ~ 2.25 V	34	60	31	32
2.25 V ~ 2.70 V	36	63	32	33

- PARS Logo ON/OFF(Bit 0)

Enables/disables the display of PARS logo at power on.

4.5.3 OPTION 3 BITS

- Curtain function at power ON(Bit 7)

Enables/disables the curtain function at power ON. The frequency and volume of associated beep sound is controlled by NVM data.

ALIGNMENT INSTRUCTIONS

- Teletext language option(Bit 6, 5&4)

	Bit6, 5&4
Latin West	000
Latin East	001
Russia	010
Persia	011
Arabic	100
Not used	101
..	
Not used	111

Teletext National Option table for each language option:

Teletext table	C12	C13	C14	Basic Char.Set	Twist Char.Set	NOT	EW
Latin West	0	0	0	Latin	Latin	English	West
	0	0	1	Latin	Latin	German	West
	0	1	0	Latin	Latin	Swedish/Fin	West
	0	1	1	Latin	Latin	Italian	West
	1	0	0	Latin	Latin	French	West
	1	0	0	Latin	Latin	Spanish/Portuguese	West
	1	1	0	Latin	Latin	Turkish	West
	1	1	1	Latin	Latin	English	West
Latin East	0	0	0	Latin	Latin	Polish	East
	0	0	1	Latin	Latin	German	East
	0	1	0	Latin	Latin	Estonian	East
	0	1	1	Latin	Latin	German	East
	1	0	0	Latin	Latin	German	East
	1	0	1	Latin	Latin	Slovenian	East
	1	1	0	Latin	Latin	Czech/Slovak	East
	1	1	1	Latin	Latin	Rumanian	East
Russian	0	0	0	Latin	Latin	English	West
	0	0	1	Latin	Latin	German	West
	0	1	0	Latin	Latin	Estonian	East
	0	1	1	Latin	Latin	German	East
	1	0	0	Cyrillic	Latin	Russia	East
	1	0	1	Cyrillic	Latin	Ukrainian	East
	1	1	0	Latin	Latin	Czech/Slovak	East
	1	1	1	Latin	Latin	Rumanian	East
Arabic/ Persian	0	0	0	Latin	Latin	English	West
	0	0	1	Latin	Latin	German	West
	0	1	0	Latin	Latin	Swedish/Fin	West
	0	1	1	Latin	Latin	Italian	West
	1	0	0	Latin	Latin	French	West
	1	0	1	Latin	Latin	Spanish/Portuguese	West
	1	1	0	Latin	Latin	Turkish	West
	1	1	1	Arabic	Latin	Arabic	West

- East/West correction (Bit 3)

You must enable this bit for large screen CRT which need EAST WEST correction circuitry.

- PIP(Bit 2)

Enable/disable PIP function. Make sure PIP board is inserted in the main board.

- Beep at curtain opening(Bit 1)

Enable/disable beep sound at power ON.

ALIGNMENT INSTRUCTIONS

4.5.4 TV SET ALIGNMENT

(1) G2 ALIGNMENT

- Tune a colour bar pattern.
- Fine the "G2-SCREEN" item in service mode.
- Adjust screen volume(on FBT) to make the horizontal line just before disappeared.

(2) WHITE BALANCE

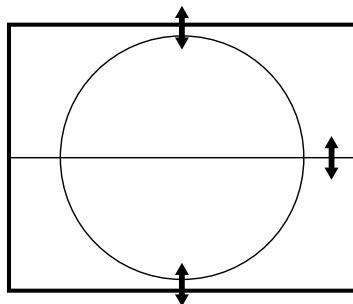
- Select a dark picture and adjust RED BIAS and GRN BIAS to the desired colour temperature.
- Select a bright picture and adjust RED, GRN and BLUE GAIN to the desired colour temperature.

(3) FOCUS

Adjust the Focus volume (on FBT) to have the best resolution on screen.

(4) VERTICAL GEOMETRY

Adjust V. LINEAR (linearity), S CORRECT (S. Correction), VERT SIZE (Vertical amplitude), VERT CENT (vertical centring) to compensate for vertical distortion.

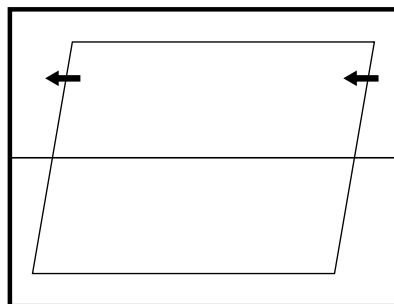


(5) HORIZONTAL PICTURE CENTRING

Adjust HOR CEN (Horizontal centre) to have the picture in the centre of the screen.

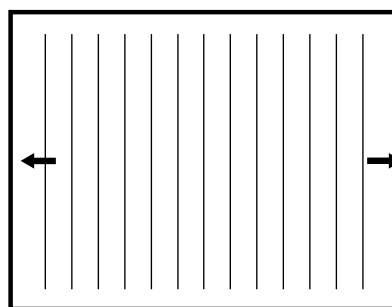
(6) EAST / WEST CORRECTION

Adjust the PARABOLA, HOR WIDTH, CORNER, HOR PARAL, EW TRAPEZ, to compensate for geometrical distortion.

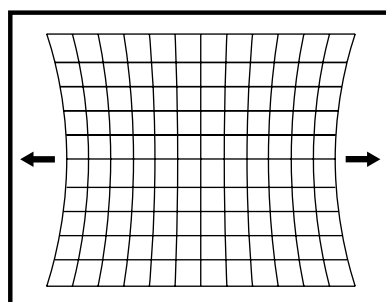


HOR PARAL

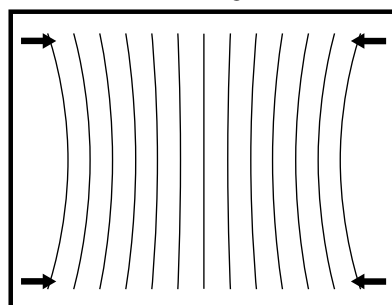
ALIGNMENT INSTRUCTIONS



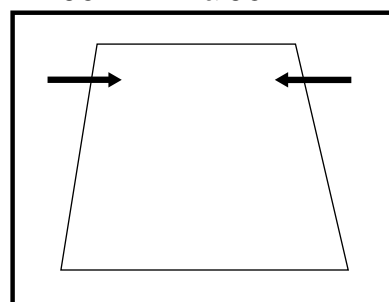
HOR WIDTH
adjust for 90% overscan.



PARABOLA



CORNER B & CORNER T



EW TRAPEZ

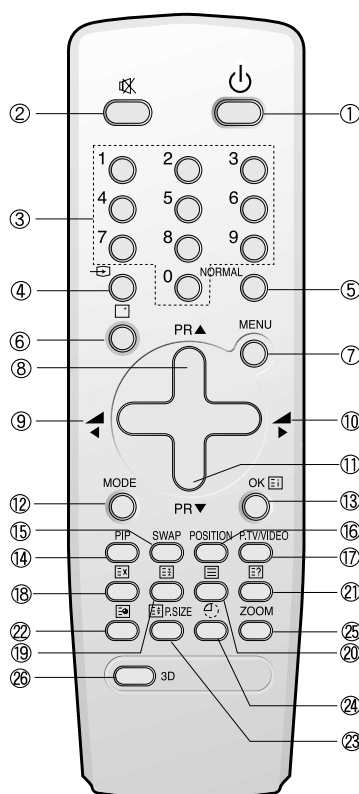
3.7.7 AGC

- Make sure option bits are correct for the tuner fitted on the chassis (See above how to change option bits).
- Adjust the antenna signal level at $62 \text{ dB } \mu\text{V} \pm 2 \mu\text{V}$
- Tune a colour bar pattern.
- Find the "AGC LEVEL" item in service mode.
- Press the key "OK" on the remote keypad and wait until AGC level stabilise to the optimum value.
- Alternatively, use "Vol Up/Dwn" keys to adjust manually to the desired Tuner Take Over Point (TOP).

Remote control

TV MODE

- ① POWER
- ② SOUND MUTE
- ③ NUMBER 0..9
- ④ TV / AV
- ⑤ NORMAL
- ⑥ RECALL
- ⑦ MENU
- ⑧ PROGRAM UP (CURSOR UP)
- ⑨ VOLUME DOWN (CURSOR LEFT)
- ⑩ VOLUME UP (CURSOR RIGHT)
- ⑪ PROGRAM DOWN (CURSOR DOWN)
- ⑫ MODE
- ⑬ OK / PRESET
- ⑭ PIP ON
- ⑮ PIP PICTURE SWAP
- ⑯ PIP POSITION
- ⑰ PIP PICTURE SOURCE
- ⑱ .
- ⑲ .
- ⑳ TV → TELETEXT
- ㉑ .
- ㉒ .
- ㉓ PIP PICTURE SIZE
- ㉔ SLEEP
- ㉕ ZOOM
- ㉖ 3D (SOUND EFFECT)



TELETEXT MODE

- ① POWER
- ② SOUND MUTE
- ③ NUMBER 0..9
- ④ .
- ⑤ .
- ⑥ .
- ⑦ VOL/BRIGHT MENU SELECTION
- ⑧ PAGE UP
- ⑨ VOL / BRIGHT DOWN
- ⑩ VOL / BRIGHT UP
- ⑪ PAGE DOWN
- ⑫ .
- ⑬ INDEX
- ⑭ RED
- ⑮ GREEN
- ⑯ YELLOW
- ⑰ CYAN
- ⑱ CANCEL
- ⑲ PAGE HOLD
- ⑳ TELETEXT → TV
- ㉑ REVEAL
- ㉒ SUBPAGE
- ㉓ HEIGHT
- ㉔ .
- ㉕ .
- ㉖ .

5. CM-500/F TYPICAL SERVICE DATA

CM-500/F CHASSIS SETTING LIST

NO	CH	PATTERN	BAND	V.FREQ.	Sound SYSTEM	Color SYSTEM	ADJUSTMENT
2	PAL H-2CH		VL	64.25	BG	PAL	
7	PAL H-7CH		VH	182.25	BG	PAL	
9	PAL H-9CH		VH	196.25	BG	PAL	
10	PAL H-10CH		VH	209.25	BG	PAL	
28	PAL H-28CH		U	527.25	BG	PAL	
30	PAL-40CH	W/B	U	623.25		AUTO	W/B
31	PAL-2CH	RETMA	VL	48.25	BG	AUTO	"FOCUS, VCENTER, VSIZE, VSLOPE H-CENTER, SCREEN CONVERGENCE, ADJUSTMENT"
32	PAL-47CH	C/HATCH	U	679.25	I	AUTO	
33	PAL-10CH	COLOR BAR	VH	210.25	BG	PAL	"SCREEN, AGC"
34	PAL-4CH	DEM	VL	62.25	BG	PAL	"SOUND, Teletext check"
35	PAL-12CH	PHILIPS	VH	224.25	BG	SECAM	SECAM COLOR CHECK
36	PAL-18CH	RETMA	U	511.25	DK	AUTO	SOUND

6. ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
ZZ100	48B5849C07	TRANSMITTER REMOCON	R-49C07 (AAA)	
ZZ110	PTACPWE135	ACCESSORY AS	DTU-29M5ME	
30	4850Q00910	BATTERY	R03/NN	
200	48586054K1	MANUAL INSTRUCTION	DTM-2082CW	
M821	4858213803	BAG INSTRUCTION	L.D.P.E TO.05X250X400(+20)	
ZZ120	PTBCSHE135	COVER BACK AS	DTU-29M5ME	
M211	4852161121	COVER BACK	HIPS GY	
M781	4857817630	CLOTH BLACK	FELT 400X20X0.7	
ZZ130	PTPKCPE135	PACKING AS	DTU-29M5ME	
10	6520010100	STAPLE PIN	AUTO W65	
M801	4858057600	BOX CARTON	DW-3	
M811	4858199100	PAD	EPS 29M5	
M821	4858215601	BAG P.E	PE FOAM 10.5x1600x1270	
ZZ131	48519A7810	CRT GROUND NET	2903S-1015-1P	
ZZ132	58G0000182	COIL DEGAUSSING	DC-29SF AL	
ZZ140	PTCACA135	CABINET AS	DTU-29M5ME	
M201A	4856017350	SCREW CRT FIX	6X27 L120 BK	
M201B	4856215402	WASHER RUBBER	CR T2.0	
M211A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M211B	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M211C	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M231A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK	
M541	4855419800	SPEC PLATE	ART 150	
M682	4856816300	CLAMP WIRE	NYLON 6 (V0)	
M683	4856812001	TIE CABLE	NYLON66 DA100	
SP01A	7172401212	SCREW TAPPTITE	TT2 TRS 4X12 MFZNBK	
SP02A	7172401212	SCREW TAPPTITE	TT2 TRS 4X12 MFZNBK	
V901	4859646261	CRT	A68KTB359X001(P) P38	
ZZ200	PTFMSJE135	MASK FRONT AS	DTU-29M5ME	
M201	4852079701	MASK FRONT	HIPS GY	
M231A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK	
M561	48556293SD	MARK BRAND	SILVER DIA-CUTTING	
M781	4857821102	CLOTH BLACK	FELT 340X10X1.5	
ZZ205	PTPCSWJ912	PANEL CONTROL AS	DTQ-29M5	
M191	4851945700	BUTTON CTRL	4951401+5545800	
M191A	7178301011	SCREW TAPPTITE	TT2 WAS 3X10 MFZN	
M231	4852328201	PANEL DECO	ABS GY	
M481	4854861401	BUTTON POWER	ABS GY	
M481A	4856716000	SPRING	SWPA PIE0.5	
M591	4855933401	DECO EYE	ABS BLUE	
M591A	7178301011	SCREW TAPPTITE	TT2 WAS 3X10 MFZN	
ZZ210	PTSPPWD703	SPEAKER AS	DTC-29M5ME	
P601A	4850704S32	CONNECTOR	YH025-04+YRT205+ULW-900	
SP01	4858311110	SPEAKER	12W 8 OHM SP-58126F	
SP02	4858311110	SPEAKER	12W 8 OHM SP-58126F	
ZZ290	PTMPMSE135	PCB MAIN MANUAL AS	DTU-29M5ME	
C310	CEYD1H689W	C ELECTRO	50V RHD 6.8MF (16X35.5)	
C405	CMYH3C103J	C MYLAR	1.6KV BUP 0.01MF J	
C406	CMYH3C912J	C MYLAR	1.6KV BUP 9100PF J	
C408	CMYE2D624J	C MYLAR	200V PU 0.62MF J	
C424	CEYF2A471V	C ELECTRO	100V RSS 470MF (16X31.5)	
C801	CL1UC3474M	C LINE ACROSS	0.47MF 1J(UCVSNDF/SV)+Q/O	
C811	CH1BFE222M	C CERA AC	U/CV AC400V 2200PF	
C817	CEYF2C221V	C ELECTRO	160V RSS 220MF (18X35.5)	
C821	CEYF1E222V	C ELECTRO	25V RSS 2200MF (16X25)	
C850	CEYD2G221D	C ELECTRO	400V FHS 220MF (25X40)	
D403	DRGP30J—	DIODE	RGF30J DO-201AD 600V 3A	
D812	DRGP30J—	DIODE	RGF30J DO-201AD 600V 3A	
D814	DSR306E20-	DIODE	SR306E20	
DF01	DLH2PR—	LED BLOCK	LH-2P-R	
F801	5F3GB6322L	FUSE GLASS TUBE	V/S TL 6.3A 250V MF51	
H01	485A101880	WIRE	1007AWG26=100	
H02	485A101980	WIRE	1007AWG26=180	
I301	PTC2SW8227	HEAT SINK ASS'Y	1TDA8358J- + 7174301011	
11TDA8358J-IC VERTICAL		TDA8358J		
0000A	4857028227	HEAT SINK	AL EX BK	
0000B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN	

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
I601	PTA2SW8232	HEAT SINK ASS'Y	1LA42152-E + 7174301011	
11LA42152-EIC AUDIO AMP		LA42152-E		
0000A	4857028232	HEAT SINK	AL EX BK	
0000B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN	
I701	1DA12072PQ	IC	TDA12072PQ/N/D	
I702	124LC16B1B	IC MEMORY	24LC16B1B	
I801	PTA2SW7924	HEAT SINK ASS'Y	1STRW6756- + 7174300811	
11STRW6756-		IC POWER	STR-W6756	
0000A	4857027924	HEAT SINK	AL EX	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
I802	1LV817C—	IC PHOTO COUPLER	LTV-817C	
I804	PTT2SW6902	HEAT SINK ASS'Y	1LD1117V33 + 7174300811	
11LD1117V33		IC REGULATOR	LD1117AV33 3.3V 2% TO-220	
0000A	4857026902	HEAT SINK	AL EX BK	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
I805	PTJ2SW7802	HEAT SINK ASS'Y	1K78R05— + 7174300811	
11K78R05—IC REGULATOR		KIA78R05API		
0000A	4857027802	HEAT SINK	AL EX	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
IF01	1346VF6—	IC PREAMP	346VF6	
JPA01	4859110950	JACK PIN BOARD	YS01-0001	
JPA02	4859111750	JACK PIN BOARD	PH-JB-9515	
L301	58C7070085	COIL CHOKE	TLN-3062A	
L401	58H0000066	COIL H-LINEARITY	TRL-230D	
LF801	5PLF28A1—	FILTER LINE	LF-28A1	
M687	4853747800	RETA PCB	NYLON 66	
PW801	4859903110	CORD POWER AS	KKP-419J-H03VVH2+H0U=2200	
A000	4859903511	CORD POWER	CW4232 H03VVH2-F=2250	
Q401	PTG2SW7609	HEAT SINK ASS'Y	TST2009DH1 + 7174300811	
1TST2009DH1		TR HORI	ST2009DHI	
0000A	4857027609	HEAT SINK	AL EX	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
Q402	TKTC3229—	TR	KTC3229	
R801	DDC7R0M290	POSISTOR	ECPCD7R0M290	
R803	RX10T339JS	R CEMENT	10W 3.3 OHM J TRIPOD SMALL	
SW801	5540101143	SW POWER PUSH	PS3-22SP (P.C.B)	
T401	50H0000294	FBT	LTC-432	
T402	5TD0000018	TRANS DRIVE	THD-120	
T801	50M4445B9-	TRANS SMPS	TSM-4445B9	
TU01	4859724930	TUNER VARACTOR	UV1316/A 1-4	
X701	5XJ24R576E	CRYSTAL QUARTZ	HC-49S 24.576MHZ 30PPM	
Z701	5PK3953M—	FILTER SAW	K3953M	
Z702	5PK9650M—	FILTER SAW	K9650M	
ZZ200	PTMPJ0E135	PCB MAIN (RHU) AS	DTU-29M5ME	
C407	CMXE2G273J	C MYLAR	400V PU 0.027MF J (TP)	
C409	CEXF2C339V	C ELECTRO	160V RSS 3.3MF (8X16) TP	
C421	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)	
C422	CEXF2C101V	C ELECTRO	160V RSS 100MF (16X25) TP	
C423	CMXE2J472J	C MYLAR	630V PU 4700PF J (TP)	
C427	CEXF1E471V	C ELECTRO	25V 470MF 10X12.5	
C613	CEXF1E222V	C ELECTRO	25V RSS 2200MF (16X25) TP	
C803	CCXB3A472K	C CERA	1KV B 4700PF K (TAPPING)	
C804	CCXB3A472K	C CERA	1KV B 4700PF K (TAPPING)	
C806	CCXB3D471K	C CERA	2KV B 470PF K (TAPPING)	
C813	CCXB3D471K	C CERA	2KV B 470PF K (TAPPING)	
C818	CEXF2C101V	C ELECTRO	160V RSS 100MF (16X25) TP	
C820	CEXF1E222V	C ELECTRO	25V RSS 2200MF (16X25) TP	
C824	CMXB2G122J	C MYLAR	400V EU 1200PF J	
C835	CEXF1C471V	C ELECTRO	16V RSS 470MF (8X12)TP	
C838	CEXF1C102V	C ELECTRO	16V RSS 1000MF (10X20) TP	
ZZ200	PTMPJBE135	PCB MAIN M-10 AS	DTU-29M5ME	
10	2TM18006BE	TAPE MASKING	6.2X500	
E001	4856310300	EYE LET	BSR TO.2 (R1.6)	
E002	4856310300	EYE LET	BSR TO.2 (R1.6)	
E003	4856310300	EYE LET	BSR TO.2 (R1.6)	
E004	4856310300	EYE LET	BSR TO.2 (R1.6)	
E005	4856310600	EYE LET	BSR TO.2 (R2.3)	
E006	4856310600	EYE LET	BSR TO.2 (R2.3)	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
E007	4856310300	EYE LET	BSR T0.2 (R1.6)		R403	RS01Z272J-	R M-OXIDE FILM	1W 2.7K OHM J (TAPPING)	
E008	4856310300	EYE LET	BSR T0.2 (R1.6)		R404	RS02Z101JS	R M-OXIDE FILM	2W 100 OHM J SMALL	
E009	4856310300	EYE LET	BSR T0.2 (R1.6)		R406	RS02Z203JS	R M-OXIDE FILM	2W 20K OHM J SMALL	
E010	4856310300	EYE LET	BSR T0.2 (R1.6)		R407	RS02Z102JS	R M-OXIDE FILM	2W 1K OHM J SMALL	
E011	4856310600	EYE LET	BSR T0.2 (R2.3)		R408	RF01Z100J-	R FUSIBLE	1W 10 OHM J (TAPPING)	
E012	4856310600	EYE LET	BSR T0.2 (R2.3)		R409	RS01Z103J-	R M-OXIDE FILM	1W 10K OHM J (TAPPING)	
E013	4856310600	EYE LET	BSR T0.2 (R2.3)		R414	RS02Z203JS	R M-OXIDE FILM	2W 20K OHM J SMALL	
E014	4856310600	EYE LET	BSR T0.2 (R2.3)		R419	RS02Z201JS	R M-OXIDE FILM	2W 200 OHM J SMALL	
E018	4856310300	EYE LET	BSR T0.2 (R1.6)		R422	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
E019	4856310300	EYE LET	BSR T0.2 (R1.6)		R807	RF02Z188K-	R FUSIBLE	2W 0.18 OHM K (TAPPING)	
E020	4856310300	EYE LET	BSR T0.2 (R1.6)		R813	RF02Z688K-	R FUSIBLE	2W 0.68 OHM K (TAPPING)	
E021	4856310300	EYE LET	BSR T0.2 (R1.6)		R830	RS02Z104JS	R M-OXIDE FILM	2W 100K OHM J SMALL	
E022	4856310600	EYE LET	BSR T0.2 (R2.3)		Z2200	PTMPJRE136	PCB MAIN RADIAL AS	DTU-29M5ME	
E023	4856310600	EYE LET	BSR T0.2 (R2.3)		C102	CEXF1C100V	C ELECTRO	RSS 16V 10MF 4X7	
E024	4856310600	EYE LET	BSR T0.2 (R2.3)		C104	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP	
E025	4856310600	EYE LET	BSR T0.2 (R2.3)		C106	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP	
E026	4856310300	EYE LET	BSR T0.2 (R1.6)		C128	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
E027	4856310300	EYE LET	BSR T0.2 (R1.6)		C130	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
E028	4856310300	EYE LET	BSR T0.2 (R1.6)		C301	CMXM2A393J	C MYLAR	100V 0.039MF J (TP)	
E029	4856310300	EYE LET	BSR T0.2 (R1.6)		C305	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
E030	4856310300	EYE LET	BSR T0.2 (R1.6)		C306	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
E031	4856310600	EYE LET	BSR T0.2 (R2.3)		C313	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)	
E032	4856310600	EYE LET	BSR T0.2 (R2.3)		C314	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)	
E033	4856310300	EYE LET	BSR T0.2 (R1.6)		C402	CCXB2H222K	C CERA	500V B 2200PF K (TAPPING)	
E034	4856310300	EYE LET	BSR T0.2 (R1.6)		C403	CMXM2A103J	C MYLAR	100V 0.01MF J (TP)	
E035	4856310300	EYE LET	BSR T0.2 (R1.6)		C410	CCXB2H561K	C CERA	500V B 560PF K (TAPPING)	
E036	4856310600	EYE LET	BSR T0.2 (R2.3)		C411	CEXF2E229V	C ELECTRO	250V RSS 2.2MF (8X11.5)TP	
E037	4856310600	EYE LET	BSR T0.2 (R2.3)		C412	CCXB2H221K	C CERA	500V B 220PF K (TAPPING)	
E038	4856310600	EYE LET	BSR T0.2 (R2.3)		C413	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
E039	4856310600	EYE LET	BSR T0.2 (R2.3)		C414	CMXM2A473J	C MYLAR	100V 0.047MF J (TP)	
E040	4856310300	EYE LET	BSR T0.2 (R1.6)		C416	CCXB2H102K	C CERA	500V B 1000PF K (TAPPING)	
E042	4856310300	EYE LET	BSR T0.2 (R1.6)		C425	CCXB2H102K	C CERA	500V B 1000PF K (TAPPING)	
E043	4856310600	EYE LET	BSR T0.2 (R2.3)		C601	CEXF1E470V	C ELECTRO	RSS 25V 47MF 5X11 P5.0 TA	
E044	4856310600	EYE LET	BSR T0.2 (R2.3)		C602	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
E045	4856310600	EYE LET	BSR T0.2 (R2.3)		C603	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
E046	4856310600	EYE LET	BSR T0.2 (R2.3)		C604	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
E047	4856310600	EYE LET	BSR T0.2 (R2.3)		C605	CCXB1H682K	C CERA	50V B 6800PF K (TAPPING)	
E048	4856310300	EYE LET	BSR T0.2 (R1.6)		C606	CCXB1H682K	C CERA	50V B 6800PF K (TAPPING)	
E049	4856310300	EYE LET	BSR T0.2 (R1.6)		C607	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
E050	4856310600	EYE LET	BSR T0.2 (R2.3)		C608	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
E051	4856310600	EYE LET	BSR T0.2 (R2.3)		C609	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
E059	4856310600	EYE LET	BSR T0.2 (R2.3)		C610	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
E060	4856310600	EYE LET	BSR T0.2 (R2.3)		C614	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
E065	4856310600	EYE LET	BSR T0.2 (R2.3)		C701	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
E066	4856310600	EYE LET	BSR T0.2 (R2.3)		C704	CEXF1E470V	C ELECTRO	RSS 25V 47MF 5X11 P5.0 TA	
E067	4856310600	EYE LET	BSR T0.2 (R2.3)		C707	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
E068	4856310600	EYE LET	BSR T0.2 (R2.3)		C713	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
E069	4856310600	EYE LET	BSR T0.2 (R2.3)		C716	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
E070	4856310600	EYE LET	BSR T0.2 (R2.3)		C721	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
E080	4856310600	EYE LET	BSR T0.2 (R2.3)		C722	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
E081	4856310600	EYE LET	BSR T0.2 (R2.3)		C723	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
N0010	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C726	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
N0011	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C727	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
N0012	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C730	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
N0013	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C731	CEXF1E470V	C ELECTRO	RSS 25V 47MF 5X11 P5.0 TA	
N005	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C732	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
N006	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C734	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
N007	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C735	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
N008	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)		C740	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
P402	485923182S	CONN WAFER	YW025-05 (STICK)		C749	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
P501	485923202S	CONN WAFER	YW025-07 (STICK)		C751	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
P601	485923172S	CONN WAFER	YW025-04 (STICK)		C752	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
P602	485923182S	CONN WAFER	YW025-05 (STICK)		C753	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
P603	485923192S	CONN WAFER	YW025-06 (STICK)		C754	CMXL1J154J	C MYLAR	63V MEU 0.15MF J	
P701	485923172S	CONN WAFER	YW025-04 (STICK)		C755	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	
PD01	485923162S	CONN WAFER	YW025-03 (STICK)		C756	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
R310	RS02Z129JS	R M-OXIDE FILM	2W 1.2 OHM J SMALL		C758	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)	
R317	RS02Z100JS	R M-OXIDE FILM	2W 10 OHM J SMALL		C759	CMXM2A682J	C MYLAR	100V 6800PF J (TP)	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
C761	CCXB1H101K	C CERA	50V B 100PF K (TAPPING)	
C765	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C766	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C767	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
C768	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C770	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
C771	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP	
C772	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP	
C780	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
C781	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
C783	CEXF1C100V	C ELECTRO	RSS 16V 10MF 4X7	
C784	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
C790	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP	
C805	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
C807	CCXB1H821K	C CERA	50V B 820PF K (TAPPING)	
C808	CCXB1H471K	C CERA	50V B 470PF K (TAPPING)	
C810	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP	
C812	CCXR3A102K	C CERA	HIKR 1KV 1000PF K 125C	
C814	CCXB3A271K	C CERA	1KV B 270PF K (TAPPING)	
C819	CEXF2A100V	C ELECTRO	100V RSS 10MF (6.3X11) TP	
C822	CMXM2A102J	C MYLAR	100V 1000PF J (TP)	
C825	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)	
C828	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
C836	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)	
C840	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP	
C860	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP	
C870	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP	
CD01	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
CD03	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP	
CV01	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP	
CV02	CEXF1H478V	C ELECTRO	50V RSS 0.47MF (5X11) TP	
CV03	CMXL1J104J	C MYLAR	63V MEU 0.1MF J	
F801A	4857415001	CLIP FUSE	PFC5000-0702	
F801B	4857415001	CLIP FUSE	PFC5000-0702	
I803	1K1A431B—	IC REGULATOR(SHUNT)	KIA431B 2.495V 0.5% TO-92	
L302	58C0000142	COIL CHOKE	ELC 0809 940K	
L303	58C0000142	COIL CHOKE	ELC 0809 940K	
L801	58C0000142	COIL CHOKE	ELC 0809 940K	
L812	58C0000142	COIL CHOKE	ELC 0809 940K	
Q101	TKTC3198Y-	TR	KTC3198Y	
Q403	TKTA1266Y-	TR	KTA1266Y (TP)	
Q602	TKTA1266Y-	TR	KTA1266Y (TP)	
Q701	TKTA1266Y-	TR	KTA1266Y (TP)	
Q704	TKTC3198Y-	TR	KTC3198Y	
Q705	TKTA1270Y-	TR	KTA1270Y (TP)	
Q706	TKTC3198Y-	TR	KTC3198Y	
Q707	TKTA1270Y-	TR	KTA1270Y (TP)	
Q708	TKTC3198Y-	TR	KTC3198Y	
Q721	TH2N7000—	FET	H2N7000	
Q722	TH2N7000—	FET	H2N7000	
Q810	TKSA1013Y-	TR	KSA1013Y (TP)	
Q852	TKTC3198Y-	TR	KTC3198Y	
Q853	TKTC3198Y-	TR	KTC3198Y	
QF01	TKTC3198Y-	TR	KTC3198Y	
R319	RN02B181JS	R METAL FILM	2W 180 OHM J SMALL	
R426	RN02B222JS	R METAL FILM	2W 2.2K OHM J SMALL	
R613	RN01B229JS	R METAL FILM	1W 2.2 OHM J SMALL	
R614	RN01B229JS	R METAL FILM	1W 2.2 OHM J SMALL	
R615	RN01B229JS	R METAL FILM	1W 2.2 OHM J SMALL	
R616	RN01B229JS	R METAL FILM	1W 2.2 OHM J SMALL	
SW701	5S50101090	SW TACT	THVH472GCA	
SW702	5S50101090	SW TACT	THVH472GCA	
SW703	5S50101090	SW TACT	THVH472GCA	
SW704	5S50101090	SW TACT	THVH472GCA	
SW705	5S50101090	SW TACT	THVH472GCA	
SW706	5S50101090	SW TACT	THVH472GCA	
Z2200	PTMPJAE135	PCB MAIN AXIAL AS	DTU-29M5ME	
10	2TM14006LB	TAPE MASKING	3M #232 6.0X2000M	

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
20	2TM10006LB	TAPE MASKING	3M #232-MAP-C 6.2X2000M	
A001	4859810993	PCB MAIN	330X246 D1B	
C101	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C103	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C105	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
C107	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C129	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C415	CCZB1H561K	C CERA	50V B 560PF K	
C612	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C702	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C703	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C705	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C706	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C712	CCZB1H561K	C CERA	50V B 560PF K	
C714	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C715	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C717	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C719	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C720	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C728	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
C729	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
C733	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C736	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C739	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C741	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
C750	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
C757	CCZB1H223K	C CERA	HIKB 50V 0.022MF K AXL 52	
C760	CCZB1H222K	C CERA	50V B 2200PF K (AXIAL)	
C764	CBZR1C392M	C CERA	16V Y5R 3900PF M (AXIAL)	
C769	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C782	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C785	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C798	CZCH1H100J	C CERA	50V CH 10PF J	
C799	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
C823	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
C830	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
CA02	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA03	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA07	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA08	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA09	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA10	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA19	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA20	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA30	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA31	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA35	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA36	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA39	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA40	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CD02	CCZB1H103K	C CERA	HIKB 50V 0.01MF K AXIAL	
CV16	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CV17	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CV18	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CV30	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
CV31	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
CV32	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z	
D102	DUZ33B—	DIODE ZENER	UZ-33B	
D301	D1N4937G—	DIODE	1N4937G (TAPPING)	
D401	D1N4937G—	DIODE	1N4937G (TAPPING)	
D404	D1N4937G—	DIODE	1N4937G (TAPPING)	
D405	D1N4004S—	DIODE	1N4004S	
D406	DRGP15J—	DIODE	RGP15J DO-204AC 600V 1.5A	
D410	D1N4937G—	DIODE	1N4937G (TAPPING)	
D602	D1N4148—	DIODE	1N4148 (TAPPING)	
D701	DUZ3R9B—	DIODE ZENER	UZ-3.9B	
D702	D1N4148—	DIODE	1N4148 (TAPPING)	
D703	D1N4148—	DIODE	1N4148 (TAPPING)	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK	LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
D704	DUZ3R9B—	DIODE ZENER	UZ-3.9B		J320	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
D710	D1N4148—	DIODE	1N4148 (TAPPING)		J321	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D750	DUZ9R1BM—	DIODE ZENER	UZ-9.1BM		J405	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D802	DLT2A05G—	DIODE	LT2A05G (TP)		J406	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D803	DLT2A05G—	DIODE	LT2A05G (TP)		J407	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D804	DLT2A05G—	DIODE	LT2A05G (TP)		J408	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D805	DLT2A05G—	DIODE	LT2A05G (TP)		J410	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D807	D1N4937G—	DIODE	1N4937G (TAPPING)		J411	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D808	D1N4937G—	DIODE	1N4937G (TAPPING)		J413	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D811	D1N4148—	DIODE	1N4148 (TAPPING)		J418	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D813	D1N4937G—	DIODE	1N4937G (TAPPING)		J420	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D815	DRGP15J—	DIODE	RGF15J DO-204AC 600V 1.5A		J421	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D816	DRGP15J—	DIODE	RGF15J DO-204AC 600V 1.5A		J427	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D822	DMTZJ6R2C-	DIODE ZENER	MTZJ 6.2C		J428	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
D899	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J501	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DA01	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J502	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DA04	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J503	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DA05	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J505	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DA09	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J506	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DA10	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J507	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DF02	DUZ3R9B—	DIODE ZENER	UZ-3.9B		J601	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DV01	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J602	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
DV02	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B		J603	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J101	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J604	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J102	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J605	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J103	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J608	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J104	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J610	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J105	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J611	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J106	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J614	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J108	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J615	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J109	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J630	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J110	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J631	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J111	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J700	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J112	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J701	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J113	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J702	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J114	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J703	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J117	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J704	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J119	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J705	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J121	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J706	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J122	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J707	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J123	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J708	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J125	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J709	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J130	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J710	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J131	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J711	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J132	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J712	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J140	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J713	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J145	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J714	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J149	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J715	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J150	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J716	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J160	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J717	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J170	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J718	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J171	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J719	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J180	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J722	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J182	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J723	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J183	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J724	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J190	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J725	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J191	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J726	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J199	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J727	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J235	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J732	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J236	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J733	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J239	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J734	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J303	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J735	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J304	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J736	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J305	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J737	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J308	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J738	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J309	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J739	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J310	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J740	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J319	85801060GY	WIRE COPPER	1/0.6 TIN COATING		J743	85801060GY	WIRE COPPER	1/0.6 TIN COATING	

ELECTRICAL PARTS LIST

[illegible]

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
J857	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J879	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J888	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J890	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J898	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
J899	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA01	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA05	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA07	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA08	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA09	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA10	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA11	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA12	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA13	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA14	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA15	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA16	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA17	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA19	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA20	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JA22	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP01	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP02	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP03	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP04	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP05	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP08	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP09	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP10	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP11	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP12	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP13	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP14	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP21	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP22	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP23	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV01	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV02	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV03	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV04	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV05	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV07	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV08	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV09	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JV20	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
L101	5CPZ470K04	COIL PEAKING	47UH 10.5MM K (LAL04TB)	
L404	58C0000026	COIL BEAD	HC-4035	
L701	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L702	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L703	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L704	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L705	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L706	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L707	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L708	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L709	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L714	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L749	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L750	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)	
L801	5MC0000100	COIL BEAD	HC-3550	
LA10	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA11	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA12	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA13	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA14	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA15	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
R101	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
R102	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R103	RD-AZ100J-	R CARBON FILM	1/6 10 OHM J	
R105	RD-2Z512J-	R CARBON FILM	1/2 5.1K OHM J	
R107	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R108	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R109	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R110	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R115	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R116	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R190	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J	
R301	RD-4Z159J-	R CARBON FILM	1/4 1.5 OHM J	
R303	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J	
R304	RD-AZ823J-	R CARBON FILM	1/6 82K OHM J	
R305	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J	
R306	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R308	RD-4Z514J-	R CARBON FILM	1/4 510K OHM J	
R309	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J	
R312	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J	
R313	RN-4Z2201F	R METAL FILM	1/4 2.20K OHM F	
R314	RN-4Z2201F	R METAL FILM	1/4 2.20K OHM F	
R401	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R402	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R405	RD-4Z330J-	R CARBON FILM	1/4 33 OHM J	
R410	RD-AZ182J-	R CARBON FILM	1/6 1.8K OHM J	
R411	RD-AZ204J-	R CARBON FILM	1/6 200K OHM J	
R412	RD-AZ224J-	R CARBON FILM	1/6 220K OHM J	
R413	RD-4Z182J-	R CARBON FILM	1/4 1.8K OHM J	
R418	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
R421	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R450	RD-4Z563J-	R CARBON FILM	1/4 56K OHM J	
R601	RD-AZ622J-	R CARBON FILM	1/6 6.2K OHM J	
R602	RD-AZ132J-	R CARBON FILM	1/6 1.3K OHM J	
R603	RD-AZ224J-	R CARBON FILM	1/6 220K OHM J	
R604	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J	
R605	RD-AZ132J-	R CARBON FILM	1/6 1.3K OHM J	
R606	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J	
R607	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R609	RD-AZ202J-	R CARBON FILM	1/6 2K OHM J	
R610	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
R612	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J	
R701	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R702	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R703	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R704	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R705	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R706	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R707	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R708	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R709	RD-AZ823J-	R CARBON FILM	1/6 82K OHM J	
R710	RD-AZ563J-	R CARBON FILM	1/6 56K OHM J	
R712	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R713	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J	
R714	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R715	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J	
R719	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R720	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R722	RD-AZ100J-	R CARBON FILM	1/6 10 OHM J	
R724	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R725	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R726	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R727	RN-AZ1002F	R METAL FILM	1/6 10K OHM F	
R729	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R730	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R733	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R735	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R736	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R737	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R739	85801060GY	WIRE COPPER	1/0.6 TIN COATING	

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
R740	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
R741	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R742	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R748	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J	
R749	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R750	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R751	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R752	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
R753	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
R756	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R757	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
R758	RD-AZ393J-	R CARBON FILM	1/6 39K OHM J	
R759	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J	
R760	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R761	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R762	RD-AZ391J-	R CARBON FILM	1/6 390 OHM J	
R772	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J	
R773	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R774	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J	
R775	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J	
R776	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R777	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J	
R780	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R781	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
R782	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
R798	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J	
R799	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R802	RD-2Z824J-	R CARBON FILM	1/2 820K OHM J	
R806	RD-4Z221J-	R CARBON FILM	1/4 220 OHM J	
R808	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R809	RD-2Z152J-	R CARBON FILM	1/2 1.5K OHM J	
R810	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J	
R811	RC-2Z825KP	R CARBON COMP	1/2 8.2K OHM K	
R812	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J	
R818	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R819	RD-AZ103J-	R CARBON FILM	1/4 10K OHM J	
R821	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J	
R822	RD-4Z682J-	R CARBON FILM	1/4 6.8K OHM J	
R823	RD-4Z392J-	R CARBON FILM	1/4 3.9K OHM J	
R824	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
R825	RD-AZ432J-	R CARBON FILM	1/6 4.3K OHM J	
R827	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J	
R840	RN-4Z1003F	R METAL FILM	1/4 100K OHM F	
R841	RN-4Z1202F	R METAL FILM	1/4 12K OHM F	
R842	RN-AZ1101F	R METAL FILM	1/6 1.10K OHM F	
R843	RN-AZ1101F	R METAL FILM	1/6 1.10K OHM F	
R848	RD-AZ393J-	R CARBON FILM	1/6 39K OHM J	
R851	RD-4Z363J-	R CARBON FILM	1/4 36K OHM J	
R852	RD-4Z563J-	R CARBON FILM	1/4 56K OHM J	
RA01	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RA05	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RA06	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RA07	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RA30	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RD01	RD-AZ273J-	R CARBON FILM	1/6 27K OHM J	
RD02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RD03	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J	
RF01	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J	
RF02	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J	
RF03	RD-AZ361J-	R CARBON FILM	1/6 360 OHM J	
RF04	RD-AZ361J-	R CARBON FILM	1/6 360 OHM J	
RF05	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J	
RF06	RD-AZ112J-	R CARBON FILM	1/6 1.1K OHM J	
RF08	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J	
RF09	RD-AZ131J-	R CARBON FILM	1/6 130 OHM J	
RF10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RP01	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
RV10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	

ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
RV11	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J	
RV12	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
RV13	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
RV14	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
RV15	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RV16	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RV17	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RV18	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RV19	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
RV20	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
RV21	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
RV22	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
RV23	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
RV31	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RV32	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J	
RV33	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J	
ZZ300	PTPMSE154	PCB PIP MANUAL AS	DTU-29U1ME	
PP01A	4859274520	CONN WAFER	YFAW025-120	
XP01	5XE20R250E	CRYSTAL QUARTZ	HC-49IU 20.2500MHZ 30PPM	
ZZ200	PTPMJ2E154	PCB PIP CHIP B AS	DTU-29U1ME	
CCP01	HCQK180JBA	C CHIP CERA	50V CH 18PF J 1608	
CCP02	HCQK180JBA	C CHIP CERA	50V CH 18PF J 1608	
CCP05	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP06	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP07	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP08	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP10	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP11	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP12	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP13	HCBK473KBA	C CHIP CERA	50V X7R 0.047MF K 1608	
CCP14	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP17	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP20	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP22	HCBK103KBA	C CHIP CERA	50V X7R 0.01MF K 1608	
CCP28	HCQK221JBA	C CHIP CERA	50V CH 220PF J 1608	
IP01	1PVP9390AQ	IC CHIP PIP	PVP9390A-QG-A1	
RCP02	HRFT101JBA	R CHIP	1/10 100 OHM J 1608	
RCP03	HRFT101JBA	R CHIP	1/10 100 OHM J 1608	
RCP04	HRFT101JBA	R CHIP	1/10 100 OHM J 1608	
RCP05	HRFT101JBA	R CHIP	1/10 100 OHM J 1608	
RCP06	HRFT101JBA	R CHIP	1/10 100 OHM J 1608	
RCP10	HRFT102JBA	R CHIP	1/10 1K OHM J 1608	
ZZ200	PTPMJRE154	PCB PIP RADIAL AS	DTU-29U1ME	
CP04	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7	
CP09	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7	
CP15	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7	
CP16	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7	
CP21	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7	
CP24	CEXF1C221V	C ELECTRO	16V RSS 220MF (8X11.5) TP	
CP25	CEXF1C221V	C ELECTRO	16V RSS 220MF (8X11.5) TP	
IP02	1K1A431B—	IC REGULATOR(SHUNT)	KIA431B 2.495V 0.5% TO-92	
QP03	TKTC3198Y-	TR	KTC3198Y	
RP16	RN02B100JS	R METAL FILM	2W 10 OHM J SMALL	
ZZ200	PTPMJAE154	PCB PIP AXIAL AS	DTU-29U1ME	
A001	4859815424	PCB PIP	197X246 D1B	
CP01	CCZF1H473Z	C CERA	50V F 0.047MF Z	
DP02	D1N4148—	DIODE	1N4148 (TAPPING)	
JP01	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP02	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP03	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP04	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP05	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP06	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JP07	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
LP02	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)	
LP03	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)	
LP04	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)	
LP05	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)	

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
LP06	5CPZ100K02	COIL PEAKING	10UH K (AXIAL 3.5MM)	
RP01	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RP02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RP07	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
RP08	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J	
RP09	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RP10	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J	
RP11	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
RP12	RN-AZ3301F	R METAL FILM	1/6 3.3K OHM F	
RP13	RN-AZ1101F	R METAL FILM	1/6 1.10K OHM F	
RP15	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J	
RP17	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
ZZ320	PTUNSW136	PCB UNION AS	DTU-29M5MT	
C930	CH1BFE472M	C CERA AC	AC400V 4700PF M U/C/V	
HP01	4859105240	JACK PHONE	LG11516-0100	
I901	PTE3SW1100	HEAT SINK ASSY	1TDA6107AJ + 7174300811	
11TDA6107AJ		IC VIDEO	DTA6107AJF	
0000A	4857031100	HEAT SINK	A1050P-H24 T2.0	
0000B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN	
ID01	1PNA4603H-	IC PHOTO SENSOR	PNA4603H	
JV03	4859105450	JACK PIN BOARD	YSC03P-4120-9S	
M231	4851114004	PANEL AV ASSY	2326802+5934302	
M231A	7178301011	SCREW TAPPTITE	TT2 WAS 3X10 MFZN	
M681	4856812001	TIE CABLE	NYLON66 DA100	
M781	4857821300	CLOTH BLACK	CLOTH	
PA402	4850705S04	CONNECTOR	YH025-05+YBNH250+ULW=400	
PA501	4850707S09	CONNECTOR	YH025-07+YST025+ULW=500	
PA602	4850705S12	CONNECTOR	YH025-05+YST025+ULW=500	
PA603	4850706S18	CONNECTOR	YH025-06+YST025+ULW=500	
PDA1	4850703S18	CONNECTOR	YH025-03+YBNH250+ULW=200	
SCT4	4859303530	SOCKET CRT	PCS629-03C	
ZZ200	PTUNJ0E136	PCB UNION RHU AS	DTU-29M5MT	
C905	CEXF2E100V	C ELECTRO	250V RSS 10MF (10X20) TP	
ZZ200	PTUNJBE136	PCB UNION M-10 AS	DTU-29M5MT	
10	2TM18006BE	TAPE MASKING	6.2X500	
R914	RS02Z2309JS	R M-OXIDE FILM	2W 3 OHM J SMALL	
R916	RS02Z271JS	R M-OXIDE FILM	2W 270 OHM J SMALL	
ZZ200	PTUNJRE136	PCB UNION RADIAL AS	DTU-29M5MT	
C901	CCXB1H561K	C CERA	50V B 560PF K (TAPPING)	
C903	CMXL2E104K	C MYLAR	250V MEU 0.1MF K	
C904	CEXF2E109V	C ELECTRO	250V RSS 1MF (6.3X11)	
C922	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	
C923	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	
C924	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	
C928	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	
C929	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP	
CS01	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP	
CS02	CEXF1H100A	C ELECTRO	50V RSM 10MF (5X7) TP	
RS01	RN01B151JS	R METAL FILM	1W 150 OHM J SMALL	
RS02	RN01B151JS	R METAL FILM	1W 150 OHM J SMALL	
ZZ200	PTUNJAE136	PCB UNION AXIAL AS	DTU-29M5MT	
10	2TM14006LB	TAPE MASKING	3M #232 6.0X2000M	
20	2TM10006LB	TAPE MASKING	3M #232-MAP-C 6.2X2000M	
A001	4859813060	PCB UNION	246X246/3(82X246) D1B	
CA11	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA12	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA13	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CA14	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)	
CD04	CCZB1H561K	C CERA	50V B 560PF K	
D905	D1N4937G—	DIODE	1N4937G (TAPPING)	
D906	D1N4937G—	DIODE	1N4937G (TAPPING)	
D907	D1N4937G—	DIODE	1N4937G (TAPPING)	
D908	DLT2A05G—	DIODE	LT2A05G (TP)	
DA11	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B	
DA12	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B	
DA13	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B	
DD01	DMTZJ5R6B-	DIODE ZENER	MTZJ 5.6B	
JS01	85801060GY	WIRE COPPER	1/0.6 TIN COATING	

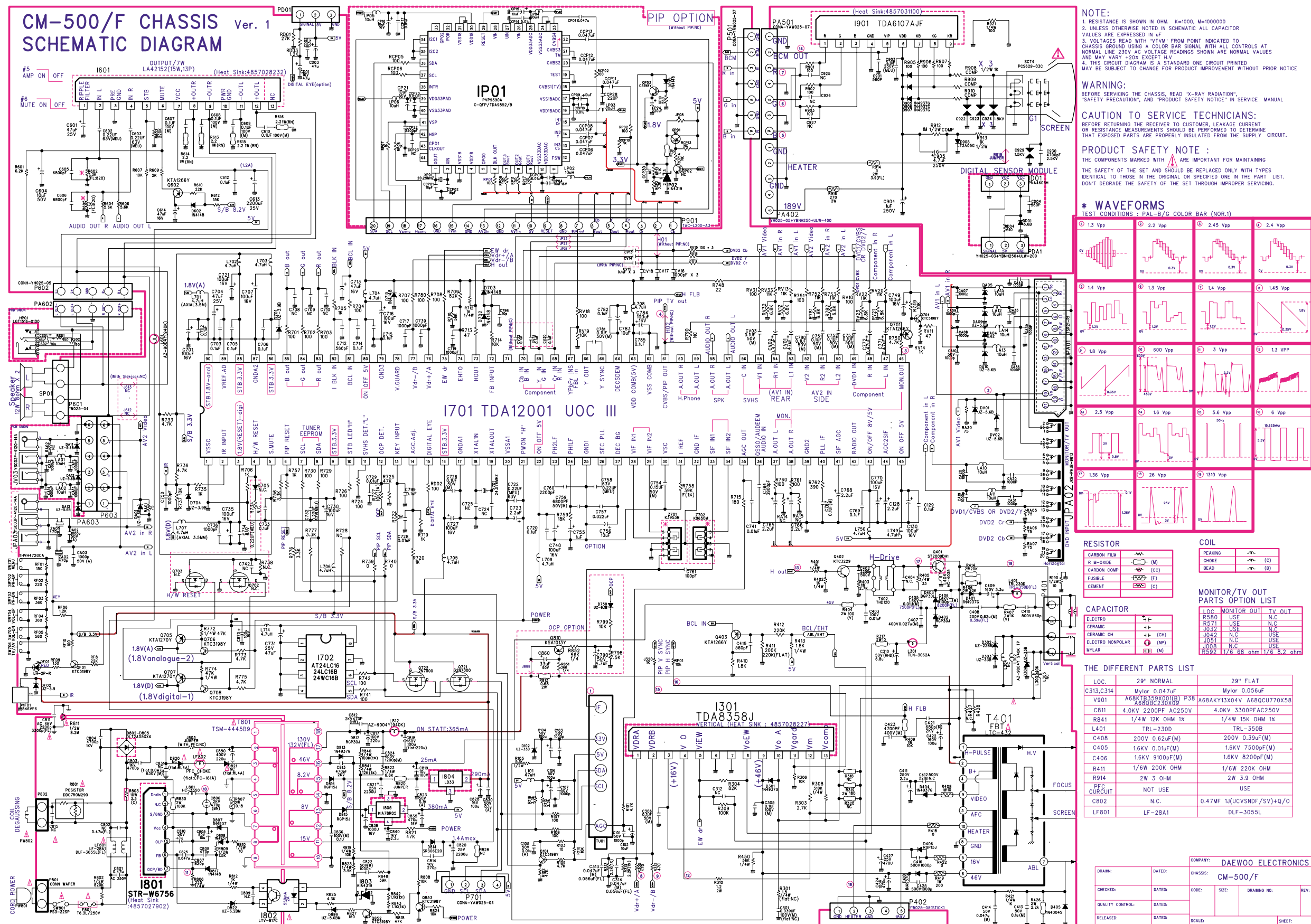
ELECTRICAL PARTS LIST

LOC	PART CODE	PART NAME	DESCRIPTION	REMARK
JS02	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
JS03	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
LA01	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
LA02	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)	
R901	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R902	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R903	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R905	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R906	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R907	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J	
R908	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R909	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R910	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K	
R912	RD-2Z105J-	R CARBON FILM	1/2 1M OHM J	
R913	RD-2Z102J-	R CARBON FILM	1/2 1K OHM J	
R915	85801060GY	WIRE COPPER	1/0.6 TIN COATING	
R921	RD-4Z101J-	R CARBON FILM	1/4 100 OHM J	
RA02	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J	
RD04	RD-AZ511J-	R CARBON FILM	1/6 510 OHM J	

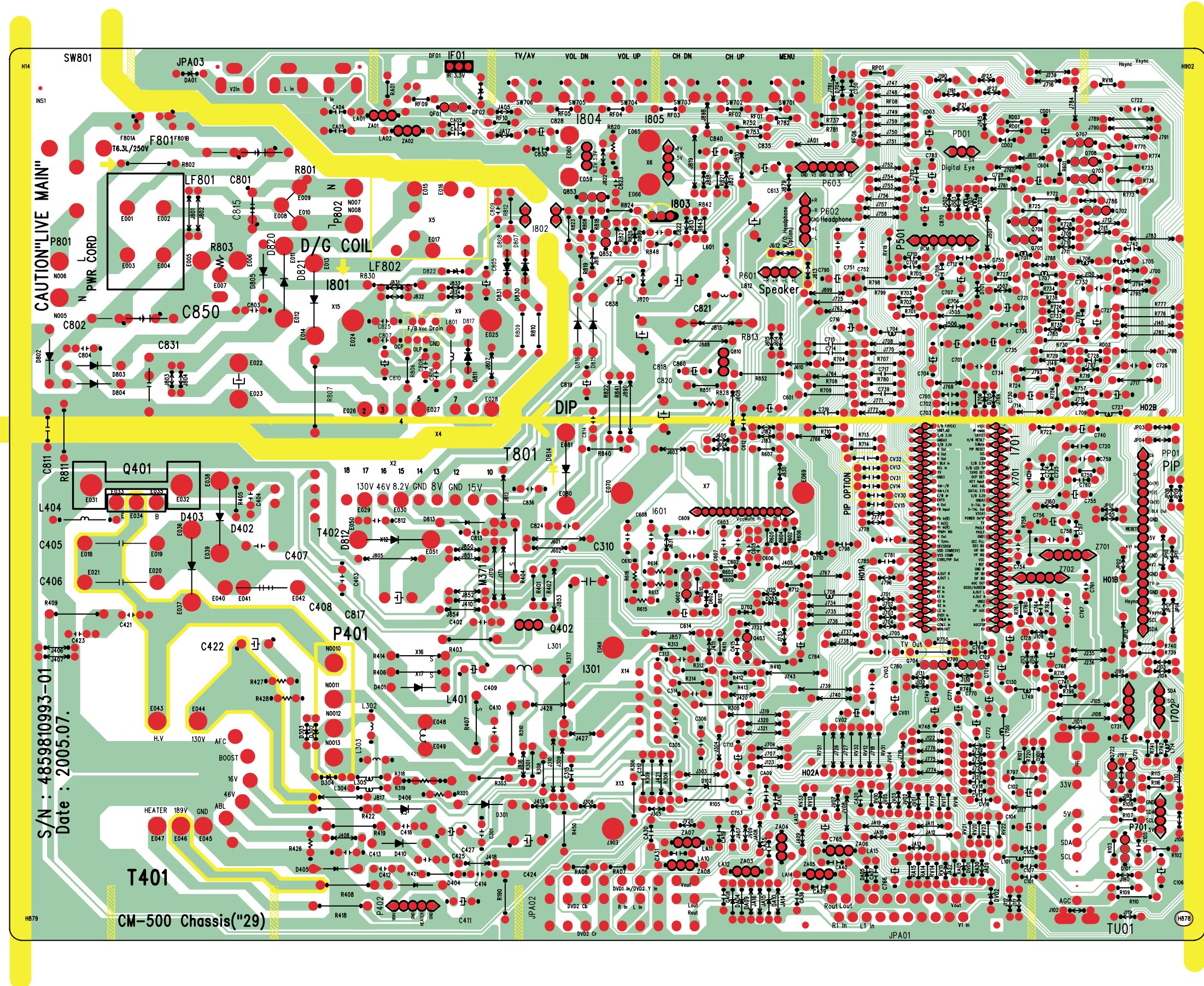
7. EACH MODEL PARTS LIST

LOC	PART NAME	NORMAL	FLAT
A001	PCB MAIN	4859810993	4859811493
C313	C MYLAR	100V 0.047MF J (TP)	100V 0.056MF J (TP)
C314	C MYLAR	100V 0.047MF J (TP)	100V 0.056MF J (TP)
C405	C MYLAR	1.6KV BUP 0.01MF J	1.6KV BUP 7500PF J
C406	C MYLAR	1.6KV BUP 9100PF J	1.6KV BUP 8200PF J
C408	C MYLAR	200V PU 0.62MF J	200V PU 0.39MF J
C802	C LINE ACROSS	N.C	0.47MF 1J(UCVSNDF/SV)+Q/O
C811	C CERA AC	4.0KV 2200PF M AD AC250V	4.0KV 3300PF M SD AC250V
C831	C MYLAR	N.C	630V PU 0.047MF J
D820	DIODE	N.C	RL4A-015-308
D821	DIODE	N.C	RL4A-015-308
"J803 J804"	WIRE COPPER	1/0.6 TIN COATING	N.C
L401	COIL H-LINEARITY	TRL-230D	TRL-350B
LF801	FILTER LINE	LF-28A1	DLF-3055L
R411	R CARBON FILM	1/6 200K OHM J	1/6 220K OHM J
R841	R METAL FILM	1/4 12K OHM F	1/4 15K OHM F
R914	R M-OXIDE FILM	2W 3 OHM J SMALL	2W 3.9 OHM SMALL
V901	CRT	"A68KTB359X001(B) P38(OEC) A68QBC230X09(LG)"	"A68AKY13X04V(CPT) A68QCU770X58 P38(LG)"
DIGITAL EYE MODULE		O	X (O:Model for 29U8 Series)

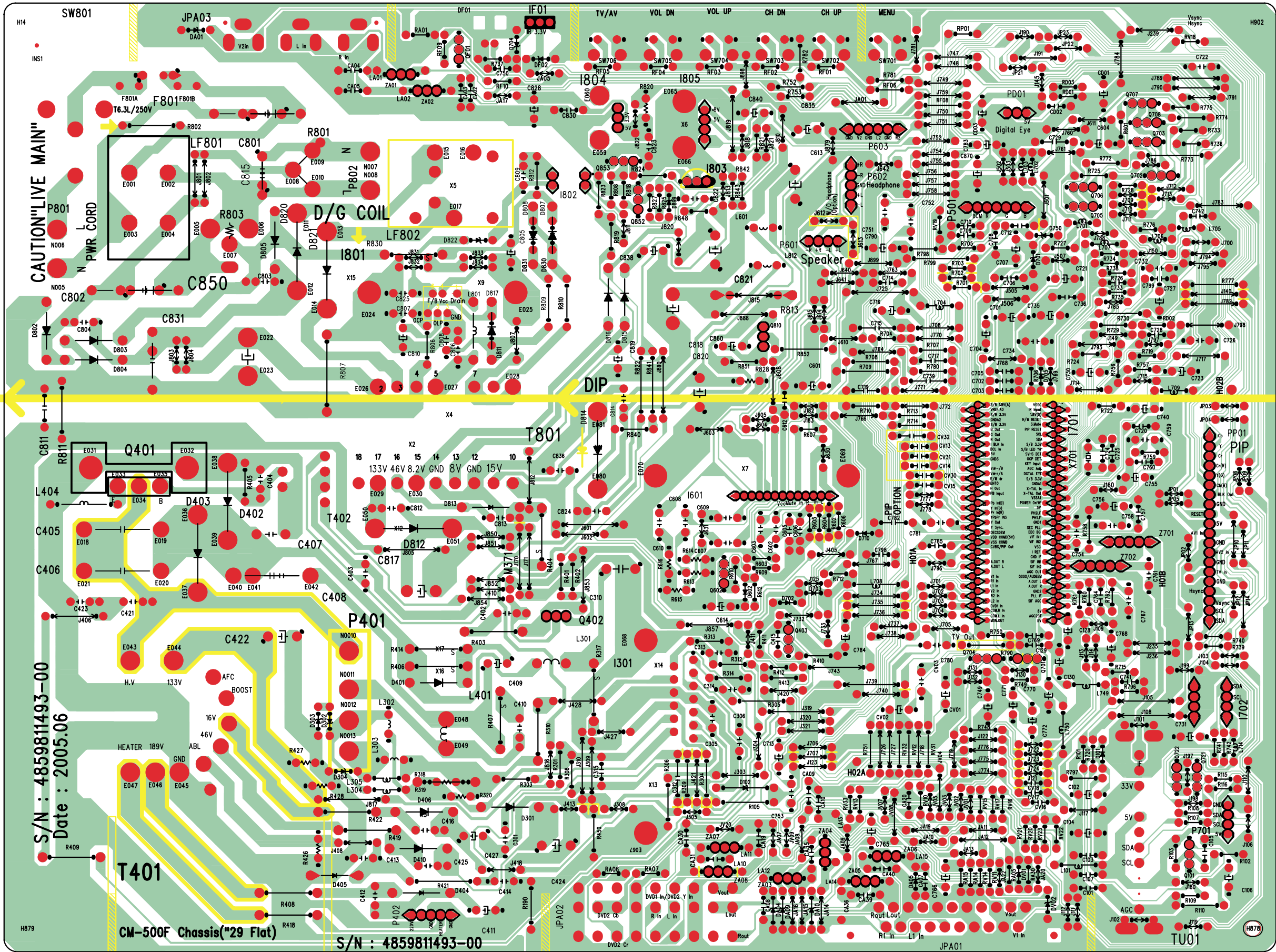
8. SCHEMATIC DIAGRAM

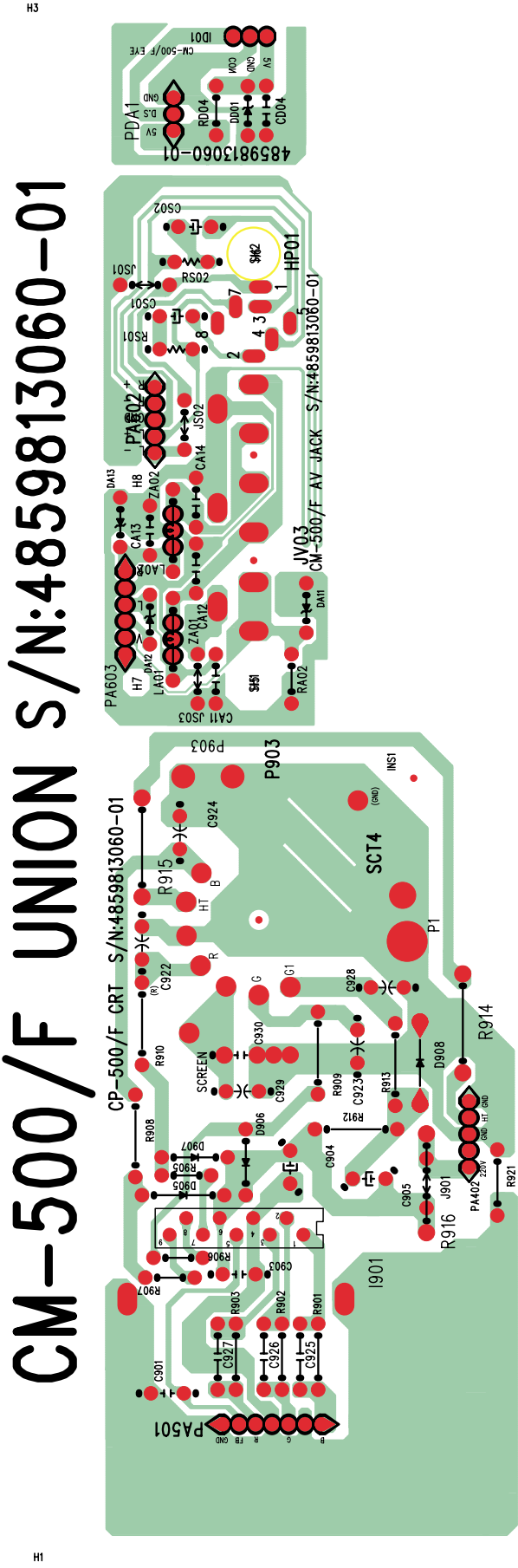


9. PRINTED CIRCUIT BOARD (CM-500)



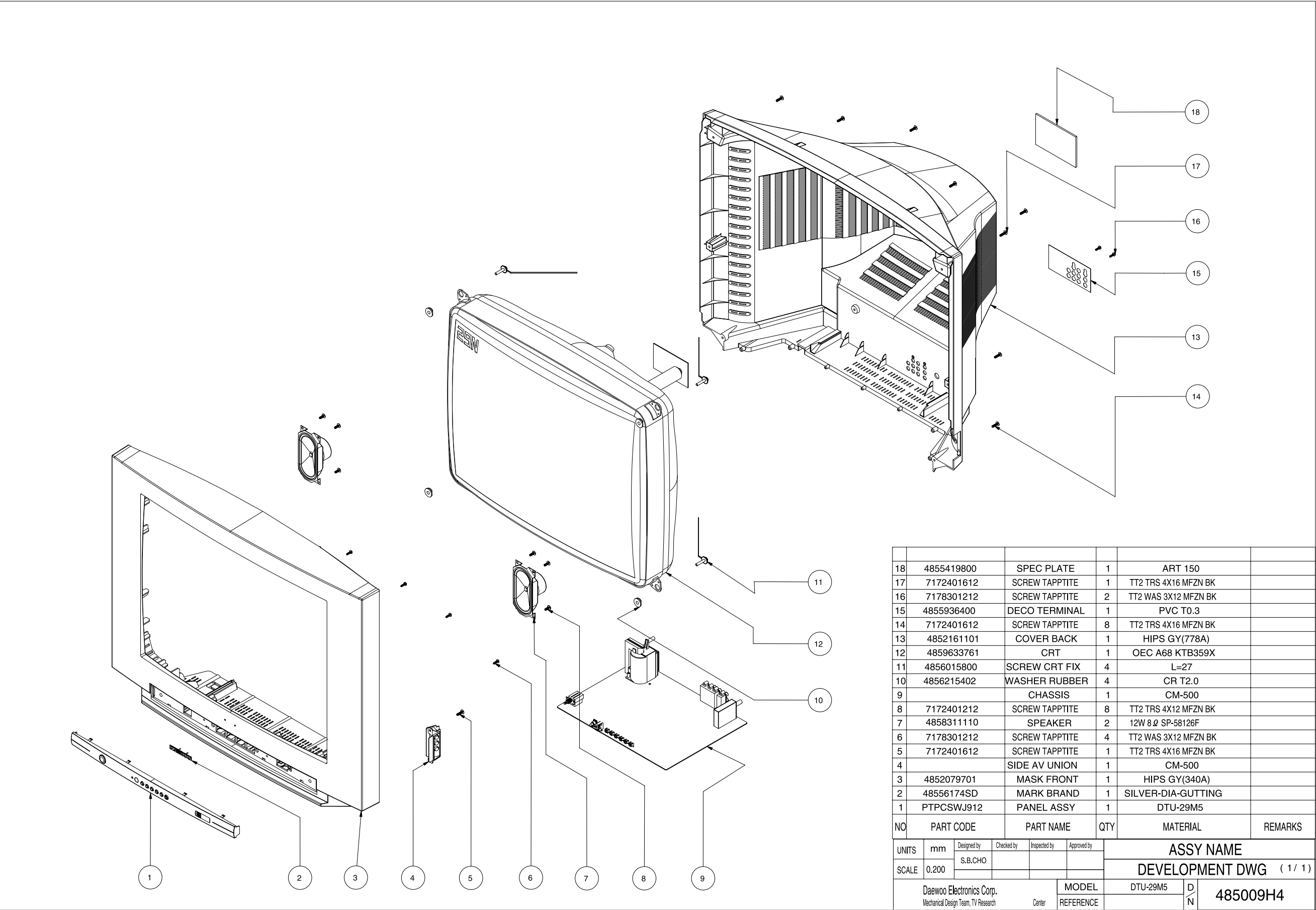
PRINTED CIRCUIT BOARD(CM-500F)





10. Mechanical Exploded View

DTU-29M5



Mechanical Exploded View

DTU-29M6

N/D

REV	LIST OF MODIFICATION	REASON OF MODIFICATION	DATE	NAME	APPR
△					
△					

18					
17					
16	4855419800	SPEC PLATE	1	ART 150	
15	7172401612	SCREW TAPPTITE	1	TT2 TRS 4X16 MFZN BK	13+FBT
14	7172401612	SCREW TAPPTITE	8	TT2 TRS 4X16 MFZN BK	13+3
13	4852161133	COVER BACK	1	HIPS BK	
12	4859626060	CRT	1	LG A68QBC230X	
11	4856015800	SCREW CRT FIX	4	L=27	
10	4856215402	WASHER RUBBER	4	CR T2.0	
9		CHASSIS	1	CM-500	
8	7172401212	SCREW TAPPTITE	8	TT2 TRS 4X12 MFZN BK	7+3
7	4858311110	SPEAKER	2	12W 8Ω SP-58126F	
6	7178301212	SCREW TAPPTITE	4	TT2 WAS 3X12 MFZN BK	3+1
5	7172401612	SCREW TAPPTITE	1	TT2 TRS 4X16 MFZN BK	4+3
4		SIDE AV UNION	1	CM-500	
3	4852084301	MASK FRONT	1	HIPS GY	
2	48556174SD	MARK BRAND	1	SILVER-DIA-GUTTING	
1		PANEL ASSY	1	DTR-29M6	
NO	PART CODE	PART NAME	QTY	MATERIAL	REMARKS
UNITS	mm	Designed by	Checked by	Inspected by	Approved by
SCALE	0.200	B.W.SEO			
		MODEL		DTU-29M6	
		REFERENCE		D/N	

Mechanical Exploded View

DTU-29M7

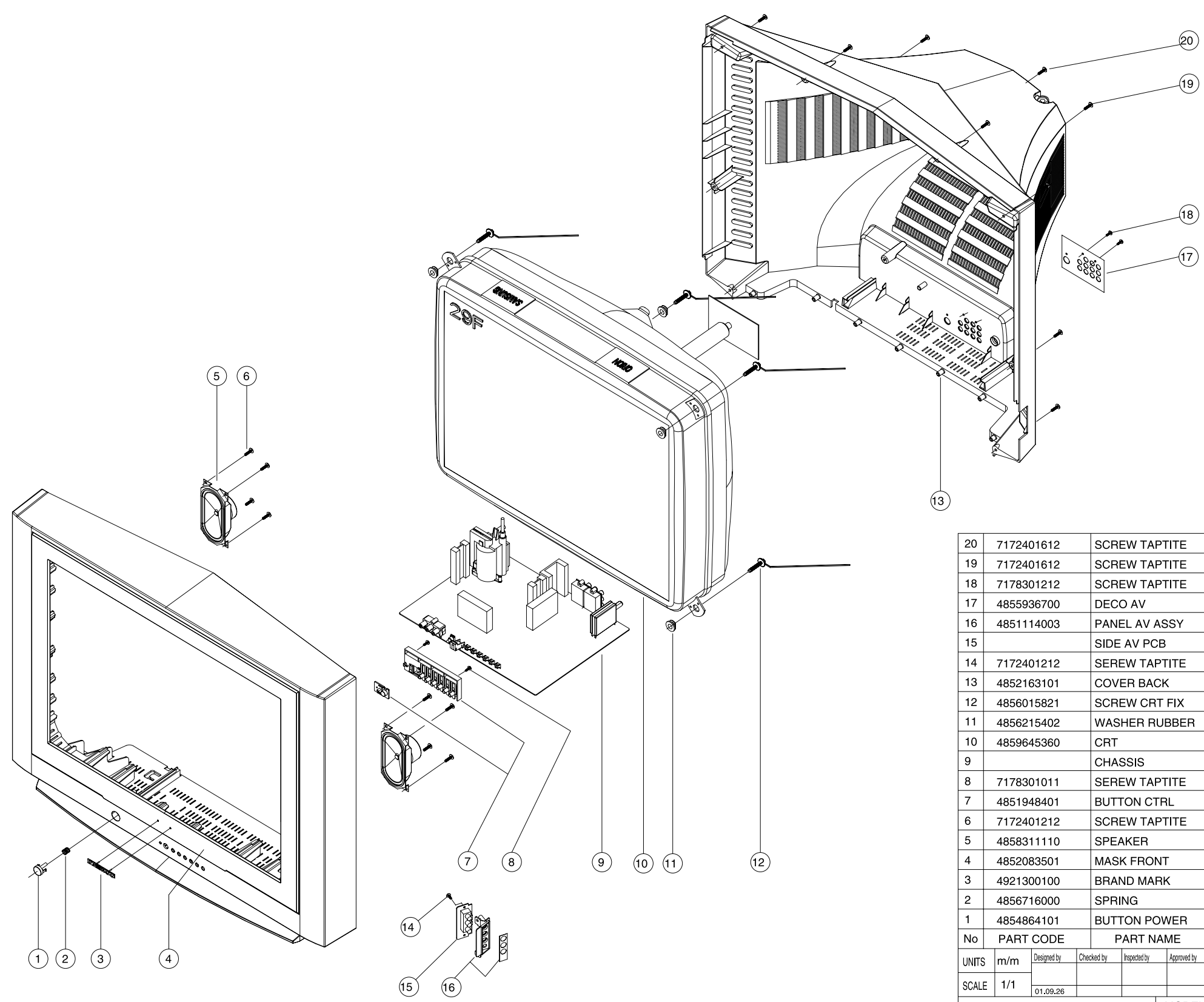
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REV	LIST OF MODIFICATION	REASON OF MODIFICATION	DATE	NAME	APPR
△					
△					

18					
17					
16	4855419800	SPEC PLATE	1	ART 150	
15	7172401612	SCREW TAPPTITE	1	TT2 TRS 4X16 MFZN BK	13+FBT
14	7172401612	SCREW TAPPTITE	8	TT2 TRS 4X16 MFZN BK	13+3
13	4852161113	COVER BACK	1	HIPS BK	
12	4859626060	CRT	1	LG A68QBC230X	
11	4856015800	SCREW CRT FIX	4	L=27	
10	4856215402	WASHER RUBBER	4	CR T2.0	
9		CHASSIS	1	CM-500	
8	7172401212	SCREW TAPPTITE	8	TT2 TRS 4X12 MFZN BK	7+3
7	4858311110	SPEAKER	2	12W 8.Ω SP-58126F	
6	7178301212	SCREW TAPPTITE	4	TT2 WAS 3X12 MFZN BK	3+1
5	7172401612	SCREW TAPPTITE	1	TT2 TRS 4X16 MFZN BK	4+3
4		SIDE AV UNION	1		
3	4852084301	MASK FRONT	1	HIPS GY	
2	48556174SD	MARK BRAND	1	SILVER-DIA-GUTTING	
1		PANEL ASSY	1	DTU-29M7	
NO	PART CODE	PART NAME	QTY	MATERIAL	REMARKS
UNITS	mm	Designed by	Checked by	Inspected by	Approved by
SCALE	0.200	B.W.SEO			
		ASSY NAME		DEVELOPMENT DWG	
Daewoo Electronics Corp.		MODEL	DTU-29M7	D	
Display R&D Center, Team #5		REFERENCE		N	

Mechanical Exploded View

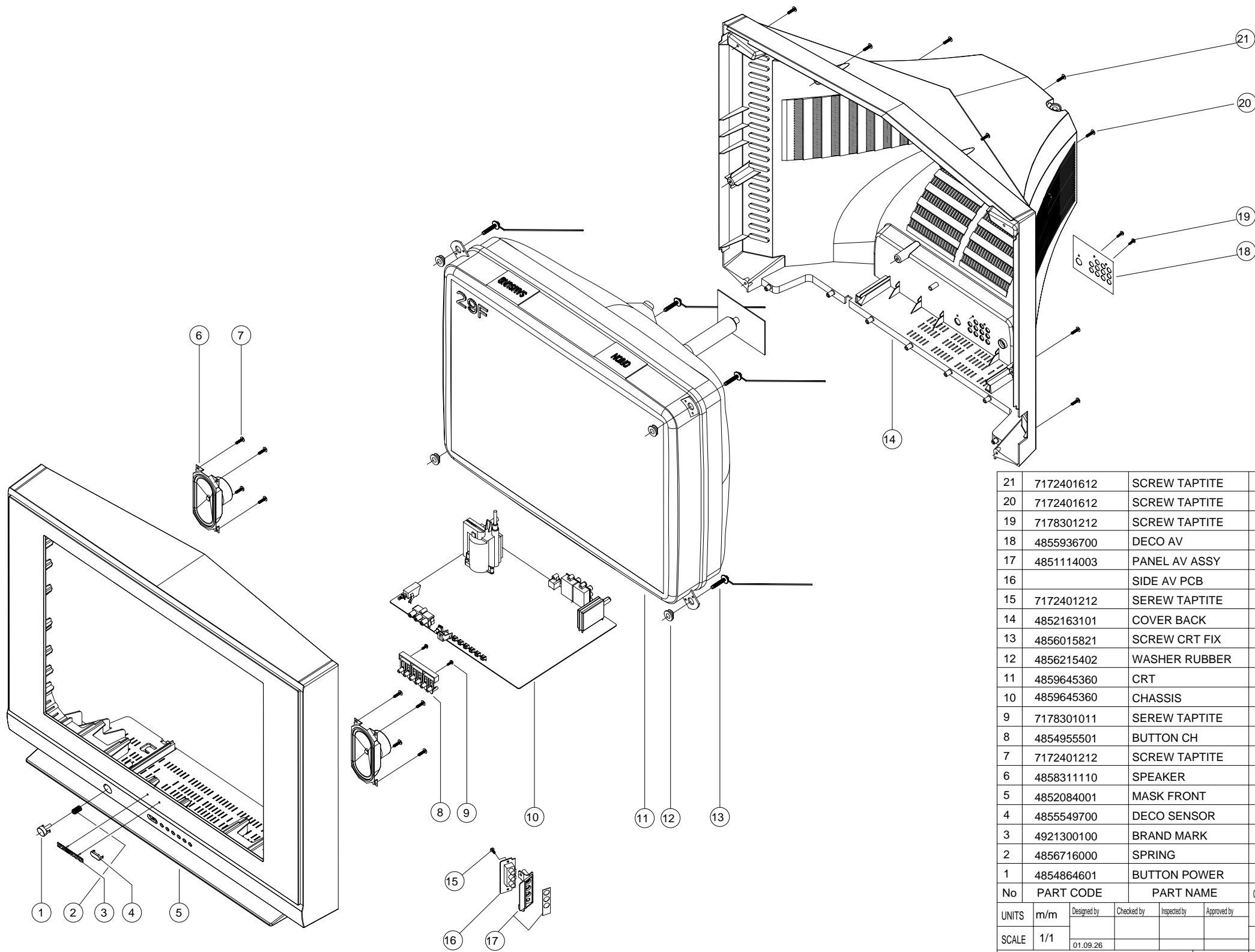
DTU-29U1



20	7172401612	SCREW TAPTITE	8	TT2 TRS 4X16 MFZN BK	
19	7172401612	SCREW TAPTITE	1	TT2 TRS 4X16 MFZN BK	
18	7178301212	SCREW TAPTITE	2	TT2 WAS 3X12 MFZN BK	
17	4855936700	DECO AV	1	PVC T0.25	
16	4851114003	PANEL AV ASSY	1	2326802+5934301	
15		SIDE AV PCB	1	CM-500F	
14	7172401212	SEREW TAPTITE	1	TT2 TRS 4X12 MFZN BK	
13	4852163101	COVER BACK	1	HIPS GY	
12	4856015821	SCREW CRT FIX	4	SWRM+SK5 L=35	
11	4856215402	WASHER RUBBER	4	CR T2.0	
10	4859645360	CRT	1	CPT A68AKY13X	
9		CHASSIS	1	CM-500F	
8	7178301011	SEREW TAPTITE	2	TT2 WAS 3X10 MFZN	
7	4851948401	BUTTON CTRL	1	4955101+5549200	
6	7172401212	SCREW TAPTITE	8	TT2 TRS 4X12 MFZN BK	
5	4858311110	SPEAKER	2	12W 8 OHM SP-58126F	
4	4852083501	MASK FRONT	1	HIPS GY	
3	4921300100	BRAND MARK	1	A1	
2	4856716000	SPRING	1	SWPA PIE0.5	
1	4854864101	BUTTON POWER	1	HIPS GY	
No	PART CODE	PART NAME	Qty	MATERIAL	REMARKS
UNITS	m/m	Designed by	Checked by	Inspected by	Approved by
SCALE	1/1	01.09.26			
DAEWOO Electronics Corp.		MODEL	DTU-29U1	D	485009KR
Mechanical Design Team, TV Research Center		REFERENCE		N	
PART NAME					
DEVELOPMENT DWG					

Mechanical Exploded View

DTU-29U5

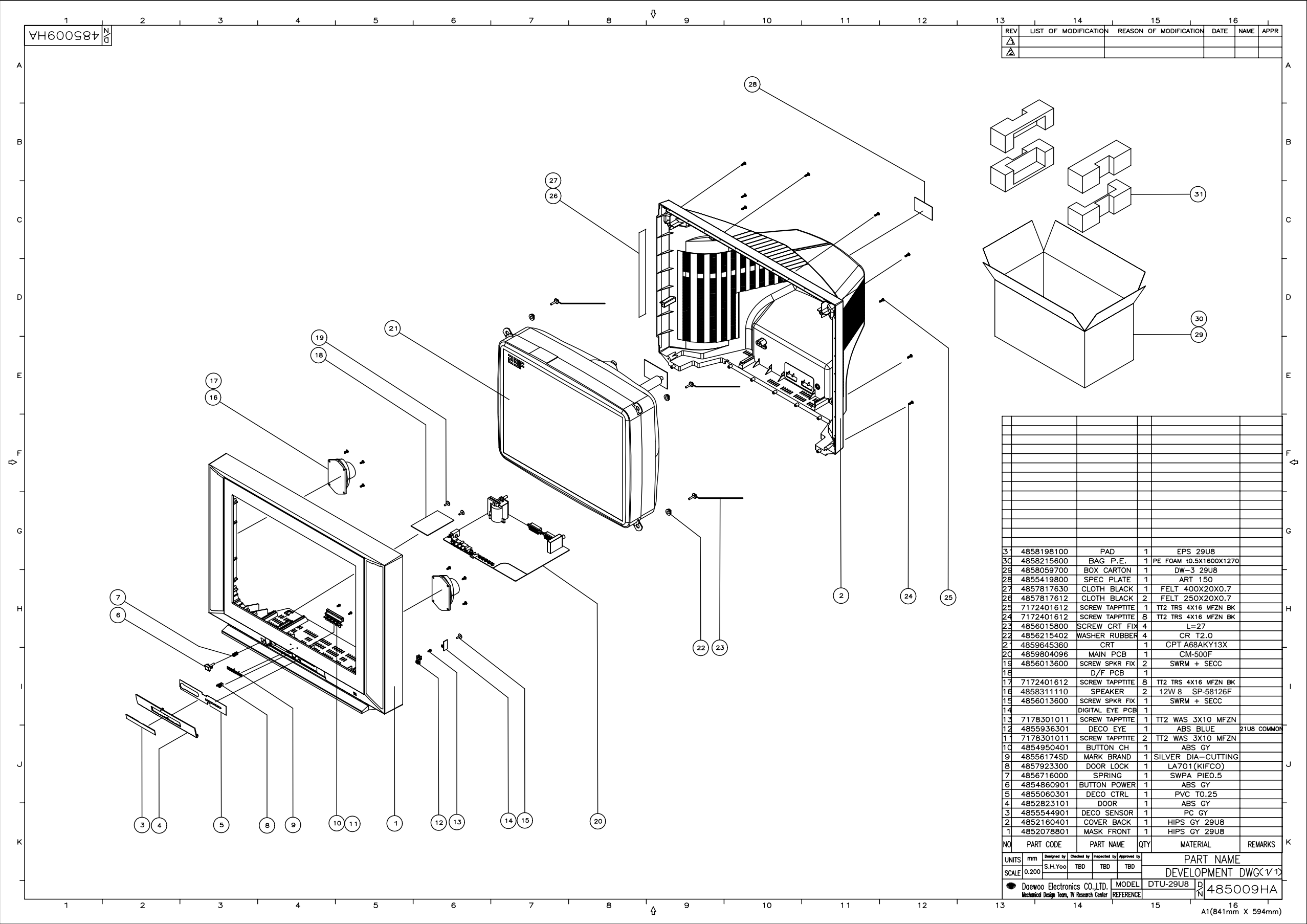


21	7172401612	SCREW TAPTITE	8	TT2 TRS 4X16 MFZN BK	
20	7172401612	SCREW TAPTITE	1	TT2 TRS 4X16 MFZN BK	
19	7178301212	SCREW TAPTITE	2	TT2 WAS 3X12 MFZN BK	
18	4855936700	DECO AV	1	PVC T0.25	
17	4851114003	PANEL AV ASSY	1	2326802+5934301	
16		SIDE AV PCB	1	CM-500F	
15	7172401212	SEREW TAPTITE	1	TT2 TRS 4X12 MFZN BK	
14	4852163101	COVER BACK	1	HIPS GY	
13	4856015821	SCREW CRT FIX	4	SWRM+SK5 L=35	
12	4856215402	WASHER RUBBER	4	CR T2.0	
11	4859645360	CRT	1	CPT A68AKY13X	
10	4859645360	CHASSIS	1	CM-500F	
9	7178301011	SEREW TAPTITE	2	TT2 WAS 3X10 MFZN	
8	4854955501	BUTTON CH	1	ABS GY	
7	7172401212	SCREW TAPTITE	8	TT2 TRS 4X12 MFZN BK	
6	4858311110	SPEAKER	2	12W 8 OHM SP-58126F	
5	4852084001	MASK FRONT	1	HIPS GY	
4	4855549700	DECO SENSOR	1	PC SMOG	
3	4921300100	BRAND MARK	1	A1	
2	4856716000	SPRING	1	SWPA PIE0.5	
1	4854864601	BUTTON POWER	1	HIPS GY	
No	PART CODE	PART NAME	Qty	MATERIAL	REMARKS
UNITS	m/m	Designed by	Checked by	Inspected by	Approved by
SCALE	1/1	01.09.26			
DAEWOO Electronics Corp. Mechanical Design Team, TV Research Center			MODEL	DTU-29U5	D N
			REFERENCE		

PART NAME
DEVELOPMENT DWG
485009KU

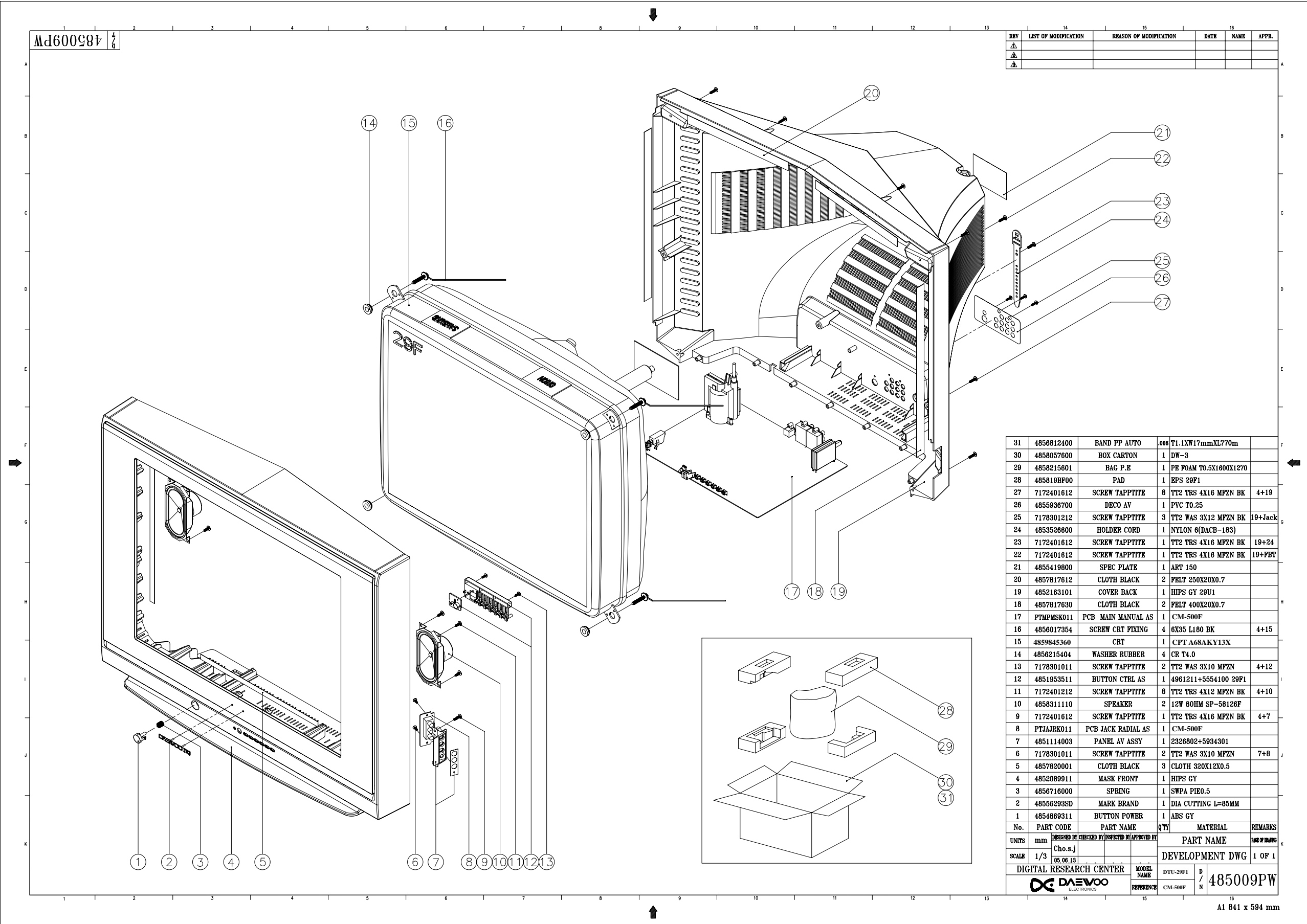
Mechanical Exploded View

DTU-29U8



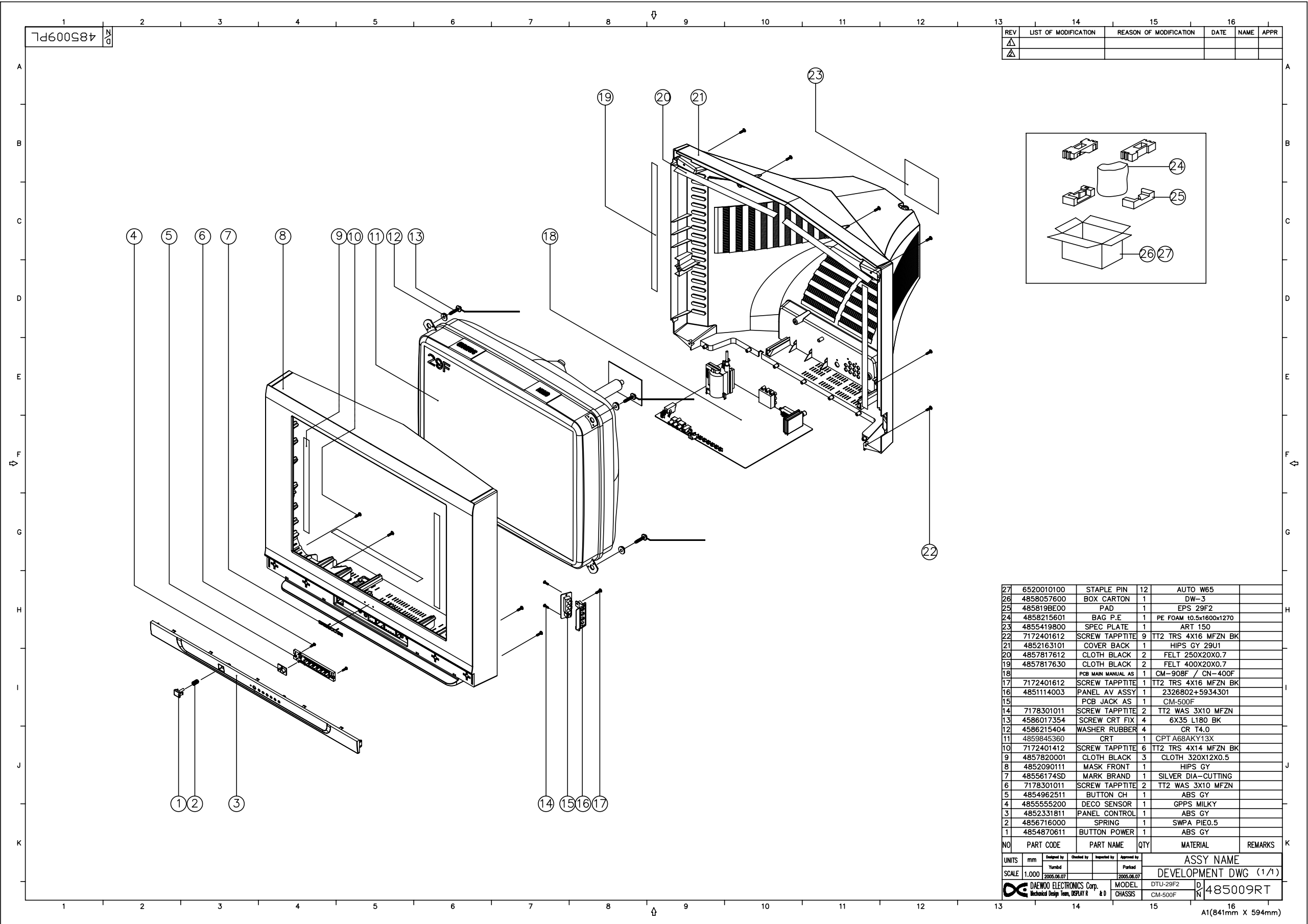
Mechanical Exploded View

DTU-29F1



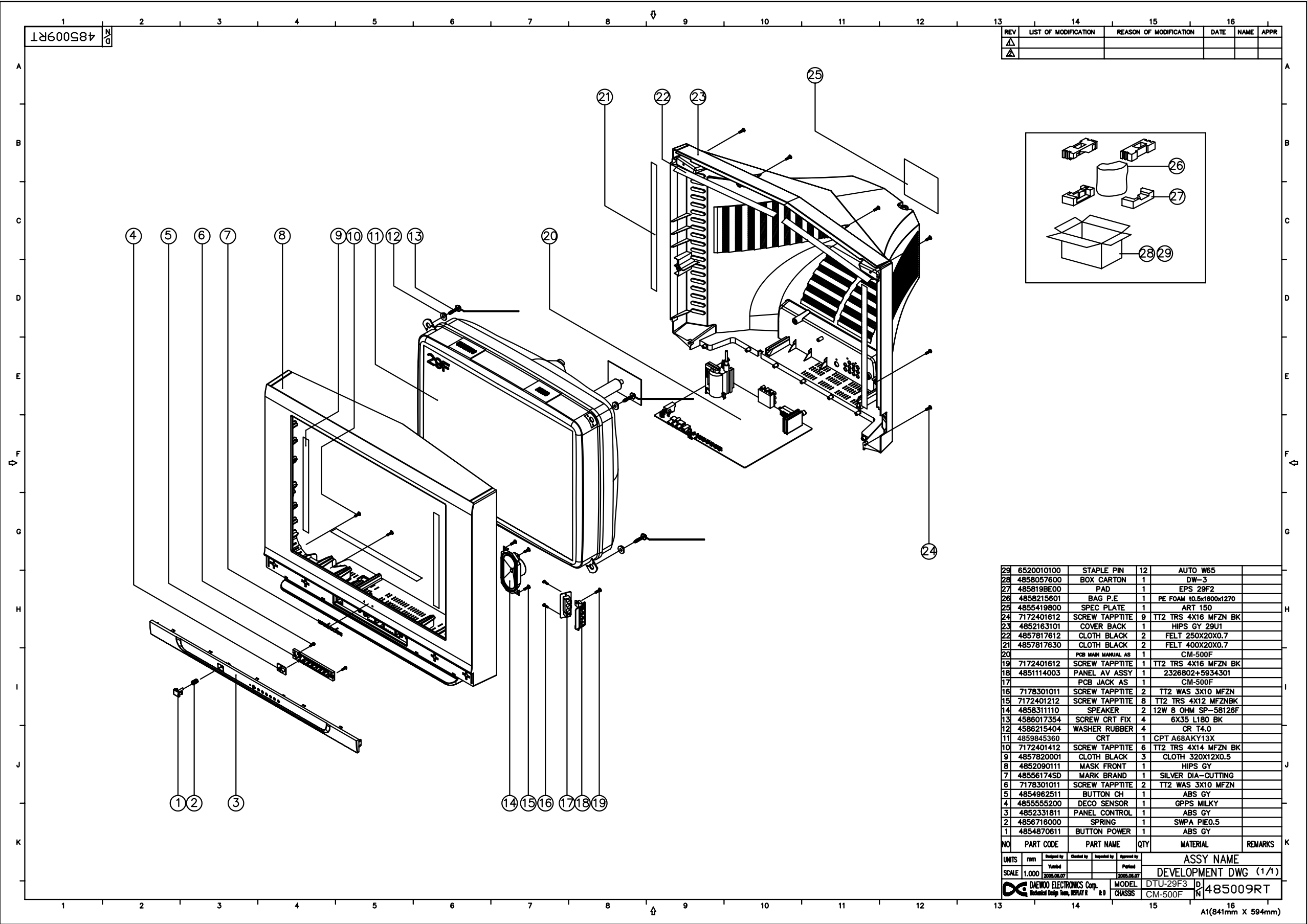
Mechanical Exploded View

DTU-29F2



Mechanical Exploded View

DTU-29F3



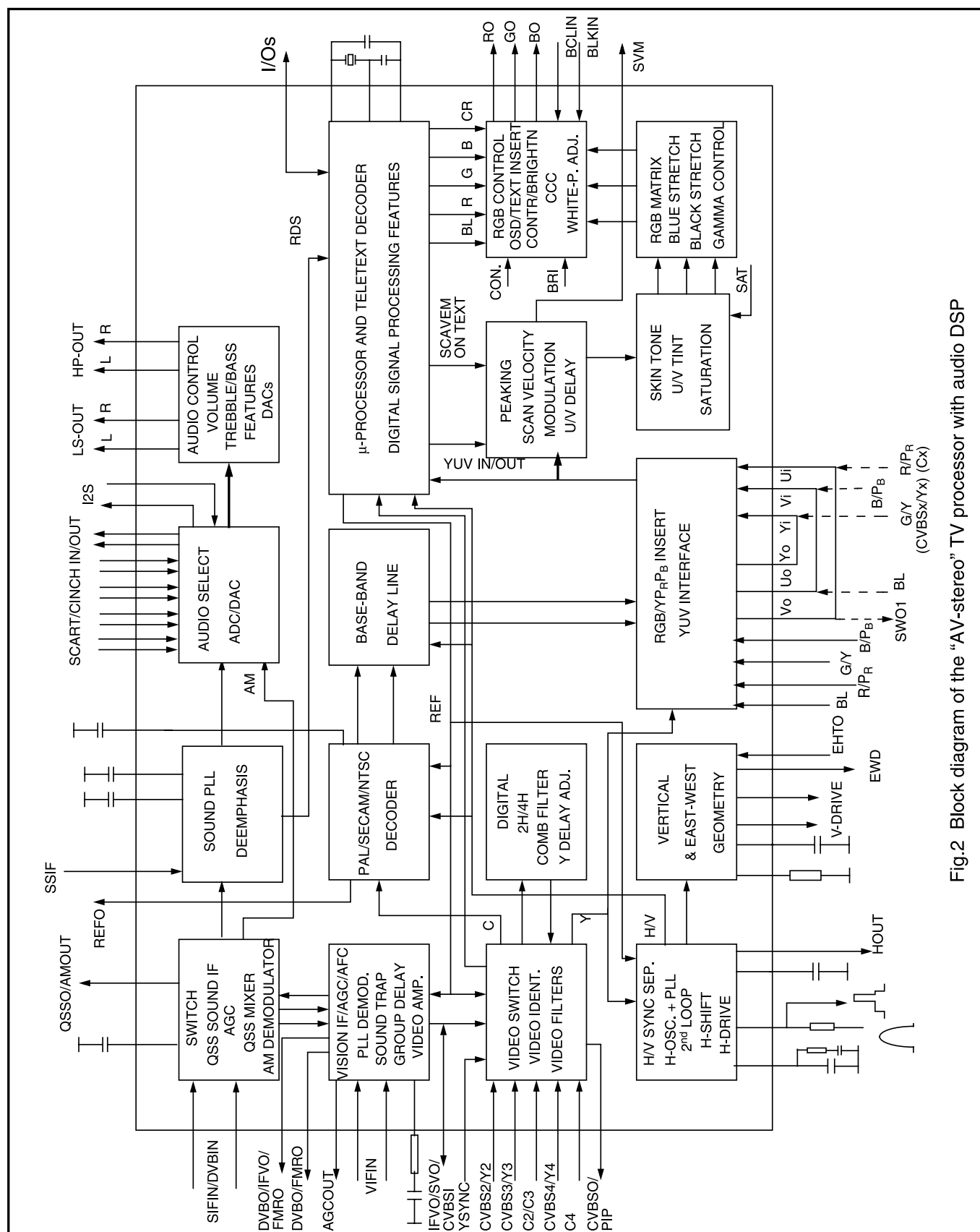


Fig.2 Block diagram of the “AV-stereo” TV processor with audio DSP

IC DESCRIPTION

1.3 PINNING

QFP 90pin	Symbol	Short Description
1	VSSC	Ground
2	INT0/P0.5	“external interrupt 0 or port 0.5(4mA current sinking capability for direct drive of LEDs)”
3	VDDC	digital supply to core(1.8V)
4	P1.0/INT1	port 1.0 or external interrupt 1
5	P1.1/T0	port 1.1 or Counter/Timer 0 input
6	P1.3/T1	port 1.3 or Counter/Timer 1 input
7	P1.6/SCL	port 1.6 or I2C-bus clock line
8	P1.7/SDA	port 1.7 or I2C-bus data line
9	VDDP(3.3V)	supply to periphery and on-chip voltage regulator(3.3V)
10	P2.0/TPWM	port 2.0 or Tuning PWM output
11	P2.1/PWM0	port 2.1 or PWM0 output
12	P3.0/ADC0	port 3.0 or ADC0 input
13	P3.1/ADC1	port 3.1 or ADC1 input
14	P3.2/ADC2	port 3.2 or ADC2 input
15	P3.3/ADC3	port 3.3 or ADC3 input
16	VDDA(3.3V)	supply(3.3V)
17	VREF_GNDA_HPL+HPR	negative reference ground SDAC(0V)
18	XTALIN	crystal oscillator input
19	XTALOUT	crystal oscillator output
20	VSSA1	Ground
21	DECDIG	decoupling digital supply
22	VP1	1st supply voltage TV-processor(+5V)
23	PH2LF	phase-2 filter
24	PH1LF	phase-1 filter
25	GND1	ground 1 for TV-processor
26	SECPLL	SECAM PLL decoupling
27	DECBG	bandgap decoupling
28	VIFIN1	IF input 1
29	VIFIN2	IF input 2
30	VSC	vertical sawtooth capacitor
31	IREF	reference current input
32	GNDIF	ground connection for IF amplifier
33	SIFIN1/DVBIN1(2)	SIF input 1/ DVB input 1

IC DESCRIPTION

QFP 90pin	Symbol	Short Description
34	SIFIN2/DVBIN2(2)	SIF input 2/ DVB input 2
35	AGCOUT	tuner AGC output
36	“QSSO/AMOUT/AUDEEM(2)”	“QSS intercarrier output/ AM output/ deemphasis(front-end audio out)”
37	AUDOUTSL	audio output for SCART/CINCH(left signal)
38	AUDOUTSR	audio output for SCART/CINCH(right signal)
39	GND2	ground 2 for TV processor
40	PLLIF	IF-PLL loop filter
41	SIFAGC/DVBAGC(2)	AGC sound IF/ internal-external AGC for DVB applications
42	DVBO/IFVO/FMRO(2)	“Digital Video Broadcast output/ IF video output/ FMradio output”
43	VCC8V/5V	8 Volt supply for audio switches(or 5V)
44	AGC2SIF	AGC capacitor second sound IF
45	VP2	2nd supply voltage TV processor(+5V)
46	IFVO/SVO/CVBSI(2)	IF video output/ selected CVBS output/ CVBS input
47	AUDIOIN4L	audio-4 input(left signal)
48	AUDIOIN4R	audio-4 input(right signal)
49	CVBS4/Y4	CVBS4/Y4 input
50	AUDIOIN2L	audio 2 input(left signal)
51	AUDIOIN2R	audio 2 input(right signal)
52	CVBS2/Y2	CVBS2/Y2 input
53	AUDIOIN3L	audio 3 input(left signal)
54	AUDIOIN3R	audio 3 input(right signal)
55	CVBS3/Y3	CVBS3/Y3 input
56	C2/C3	chroma-2/3 input
57	AUDOUTLSL	audio output for audio power amplifier(left signal)
58	AUDOUTLSR	audio output for audio power amplifier(right signal)
59	AUDOUTHPL	audio output for headphone channel(left signal)
60	AUDOUTHPR	audio output for headphone channel(right signal)
61	CVBSO/PIP	CVBS/ PIP output
62	VSScomb	ground connection for comb filter
63	VDDcomb	supply voltage for comb filter(5V)
64	DECSDEM	decoupling sound demodulator
65	YSYNC	Y-input for sync separator

IC DESCRIPTION

QFP 90pin	Symbol	Short Description
66	YOUT	Y-output (for YUV interface)
67	INSSW3	3rd RGB/ YPBPR insertion input
68	R/PRIN3	3rd R input / PR input
69	G/YIN3	3rd G input / Y input
70	B/PBIN3	3rd B input / PB input
71	SVM	scan velocity modulation output
72	FBISO/CSY	“flyback input/sandcastle output or composite H/V timingoutput”
73	HOUT	horizontal output
74	EHTO	EHT/overvoltage protection input
75	EWD/AVL(1)	East-West drive output or AVL capacitor
76	VDRA	vertical drive A output
77	VDRB	vertical drive B output
78	VGUARD/SWIO	“V-guard input/ I/O switch (e.g. 4mA current sinkingcapability for direct drive of LEDs)”
79	GND3	ground 3 for TV-processor
80	VP3	3rd supply for TV processor
81	BCLIN	beam current limiter input
82	BLKIN	black current input
83	RO	Red output
84	GO	Green output
85	BO	Blue output
86	VDDA1	“analog supply for TCG m-Controller and digital supplyfor TV-processor(+3.3V)”
87	GNDA	Ground
88	VDDA2(3.3)	supply voltage SDAC(3.3V)
89	VREFAD	reference voltage for audio ADCs(3.3/2V)
90	VDDA(1.8)	analogue supply for audio ADCs(1.8V)

IC DESCRIPTION

1.4 FEATURES

Analogue Video Processing (all versions)

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Switchable group delay correction and sound trap (with switchable centre frequency) for the demodulated CVBS signal
- DVB/VSX IF circuit for preprocessing of digital TV signals.
- Video switch with 2 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has a chroma inputs. It is possible to add an additional CVBS(Y)/C input (CVBSx) when the YUV interface and the RGB/YPRPB input are not needed.
- Automatic Y/C signal detector
- Adaptive digital (4H/2H) PAL/NTSC comb filter for optimum separation of the luminance and the chrominance signal.
- Integrated luminance delay line with adjustable delay time
- Picture improvement features with peaking (with switchable centre frequency, depeaking, variable positive/negative peak ratio, variable pre-/overshoot ratio and video dependent coring), dynamic skin tone control, gamma control and blue- and black stretching. All features are available for CVBS, Y/C and RGB/YPBPR signals.
- Switchable DC transfer ratio for the luminance signal
- Only one reference (24.576 MHz) crystal required for the TCG m-Controller, digital sound processor, Teletext and the colour decoder
- Multi-standard colour decoder with automatic search system and various “forced mode” possibilities
- Internal base-band delay line
- Indication of the Signal-to-Noise ratio of the incoming CVBS signal
- Linear RGB/YPBPR input with fast insertion.
- Tint control for external RGB/YPBPR signals
- Scan Velocity Modulation output. The SVM circuit is active for all the incoming CVBS, Y/C and RGB/YPBPR signals. The SVM function can also be used during the display of teletext pages.
- RGB control circuit with ‘Continuous Cathode Calibration’, white point and black level off-set adjustment so that the colour temperature of the dark and the light parts of the screen can be chosen independently.
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Adjustable ‘wide blanking’ of the RGB outputs
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimized for DC-coupled vertical output stages
- Horizontal and vertical geometry processing with horizontal parallelogram and bow correction and horizontal and vertical zoom
- Low-power start-up of the horizontal drive circuit

Analogue video processing (stereo versions)

- The low-pass filtered ‘mixed down’ I signal is available via a single ended

Analogue video processing (mono versions)

- The low-pass filtered ‘mixed down’ I signal is available via a single ended output stage

Digital Video Processing (some versions)

- Double Window mode applications. It is possible to display a video and a text window or 2 text

IC DESCRIPTION

windows in parallel.

- Linear and non-linear horizontal scaling of the video signal to be displayed.

Sound Demodulation (all versions)

- Separate SIF (Sound IF) input for single reference QSS (Quasi Split Sound) demodulation.
- AM demodulator without extra reference circuit
- The mono intercarrier sound circuit has a selective FM-PLL demodulator which can be switched to the different FM sound frequencies (4.5/5.5/6.0/6.5 MHz). The quality of this system is such that the external band-pass filters can be omitted. In the stereo versions of UOCIII the use of this demodulator is optional for special applications. Normally the FM demodulators of the stereo demodulator/decoder part are used (see below).
- The FM-PLL demodulator can be set to centre frequencies of 4.72/5.74 MHz so that a second sound channel can be demodulated. In such an application it is necessary that an external bandpass filter is inserted.
- The vision IF and mono intercarrier sound circuit can be used for the demodulation of FM radio signals. With an external FM tuner also signals with an IF frequency of 10.7 MHz can be demodulated.
- Switch to select between 2nd SIF from QSS demodulation or external FM (SSIF)

Audio Interfaces and switching (stereo versions with Audio DSP)

- Audio switch circuit with 4 stereo inputs, a stereo output for SCART/CINCH, 1 stereo output for HEADPHONE. The headphone channel has an analogue volume control circuit for the L and R channel. Finally 1 stereo SPEAKER output with digital controls.
- AVL (Automatic Volume Levelling) circuit for the headphone channel.
- Digital input crossbar switch for all digital signal sources and destinations
- Digital output crossbar for exchange of channel processing functionality

Stereo Demodulator and Decoder (full stereo versions)

- Demodulator and Decoder Easy Programming (DDEP)
- Auto standard detection (ASD)
- Static Standard Selection (SSS)
- DQPSK demodulation for different standards, simultaneously with 1-channel FM demodulation
- NICAM decoding (B/G, I, D/K and L standard)
- Two-carrier multistandard FM demodulation (B/G, D/K and M standard)
- Decoding for three analog multi-channel systems (A2, A2+ and A2*) and satellite sound
- Adaptive de-emphasis for satellite FM
- Optional AM demodulation for system L, simultaneously with NICAM
- Identification A2 systems (B/G, D/K and M standard) with different identification time constants
- FM pilot carrier present detector
- Monitor selection for FM/AM DC values and signals, with peak and quasi peak detection option
- BTSC MPX decoder
- SAP decoder
- dbx® noise reduction
- Japan (EIAJ) decoder
- FM radio decoder
- Soft-mute for DEMDEC outputs DEC, MONO and SAP
- FM overmodulation adaptation option to avoid clipping and distortion

Audio Multi Channel Decoder (stereo versions with Audio DSP)

- Dolby® Pro Logic® (DPL)

IC DESCRIPTION

- Five channel processing for Main Left and Right, Subwoofer, Centre and Surround. To exploit this feature an external DAC is required.

Volume and tone control for loudspeakers (stereo versions with Audio DSP)

- Automatic Volume Level (AVL) control
- Smooth volume control
- Master volume control
- Soft-mute
- Loudness
- Bass, Treble
- Dynamic Bass Boost (DBB)
- Dynamic Virtual Bass (DVB)
- BBE® Sound processing
- Graphic equalizer
- Processed or non processed subwoofer
- Programmable beeper

Reflection and delay for loudspeaker channels (stereo versions with Audio DSP)

- Dolby® Pro Logic® Delay
- Pseudo hall/matrix function

Psycho acoustic spatial algorithms, downmix and split in loudspeaker channels (stereo versions with Audio DSP)

- Extended Pseudo Stereo (EPS)
- Extended Spatial Stereo (ESS)
- Virtual Dolby® Surround (VDS 422,423)
- SRS 3D and SRS TruSurround®

RDS/RBDS(Only possible with external FM RADIO DEMOD.)

- Demodulation of the European Radio Data system (RDS) or the USA Radio Broadcast Data System (RBDS) signal
- RDS and RBDS block detection
- Error detection and correction
- Fast block synchronisation
- Synchronisation control (flywheel)
- Mode control for RDS/RBDS processing
- Different RDS/RBDS block information output modes

m-Controller

- 80C51 m-controller core standard instruction set and timing
- 0.4883 ms machine cycle
- maximum of 256k x 8-bit flash programmable ROM
- maximum of 8k x 8-bit Auxiliary RAM
- 12-level Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- One 24-bit Timer (16-bit timer with 8-bit Pre-scaler)
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- Stand-by, Idle and Power Down modes
- 12 general I/O pins
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter with 4 multiplexed inputs

IC DESCRIPTION

- PWM (6-bits) outputs for analogue control functions
- Remote Control Pre-processor (RCP)
- Universal Asynchronous Receiver Transmitter (UART)

Data Capture

- Text memory up to 10 pages
- Inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle

Page Table (SPT)

- Data Capture for US Closed Caption
- Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimized m-processor throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Vertical Blanking Interval (VBI) data capture of WST data

Display

- Teletext and Enhanced OSD modes
- Features of level 1.5 WST and US Close Caption
- 50Hz/60Hz display timing modes
- Two page operation for 16:9 screens
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters
- Smoothing capability of both Double Size, Double Width & Double Height characters
- Scrolling of display region
- Variable flash rate controlled by software
- Soft colours using CLUT with 4096 colour palette
- Globally selectable scan lines per row (9/10/13/16/) and character matrix [12x9, 12x10, 12x13, 12x16, 16x18, (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe colour selectable
- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 64 software redefinable On-Screen display characters
- 4 WST Character sets (G0/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device
- SVM for Text

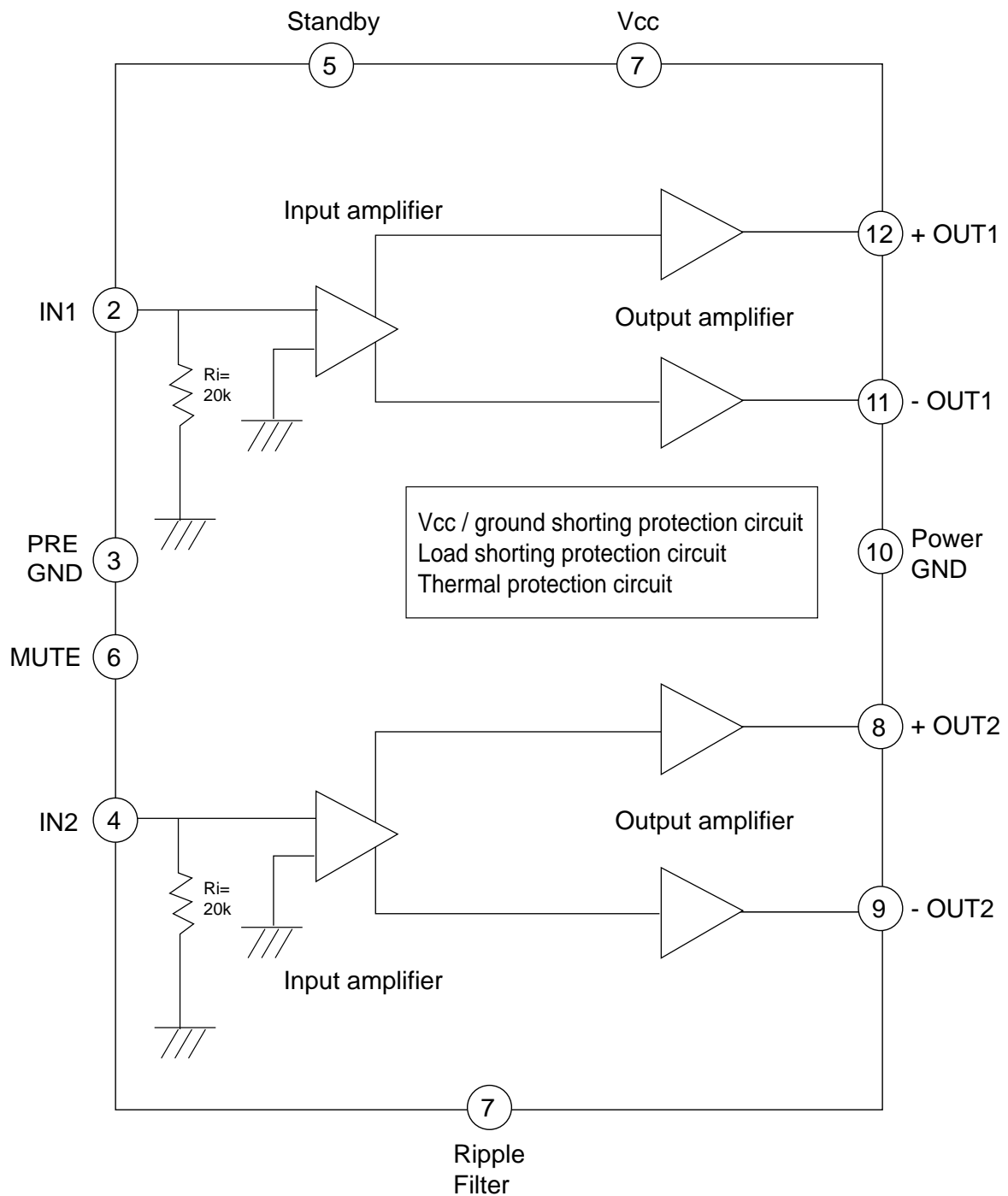
IC DESCRIPTION

2. LA42152 15W 2-CHANNEL AF POWER AMPLIFIER

2.1 Functions

- P_o 15W x 2ch ($V_{cc} = 16.5V$, $R_L = 8 \Omega$, THD = 10%)
- Built - in Standby function.
- Built - in Mute function.
- Full complement of built-in protection circuits
(Protection from shorting to ground, shorting to V_{cc} , load shorting, and overheating.)

2.2 BLOCK DIAGRAM



IC DESCRIPTION

3. TDA8358J VERTICAL AMPLIFIER

The TDA8358J are power circuit for use in 90° and 110° colour deflection systems for field frequencies of 25 to 200Hz field frequencies, and for 4:3 and 16/9 picture tubes. The IC contains a vertical deflection output circuit, operating as a high efficiency class G system. The full bridge output circuit allows DC coupling of the deflection coil in combination with single positive supply voltages.

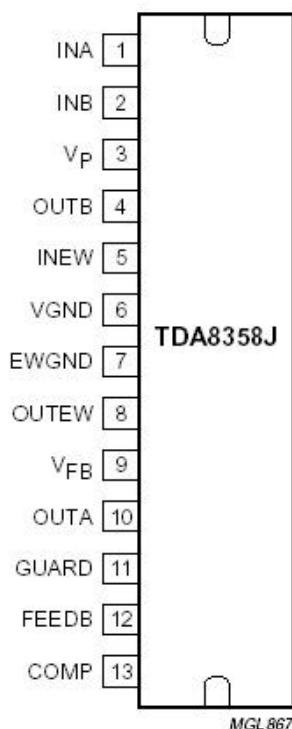
The east-west output stage is able to supply the sink current for a diode modulator circuit.

The IC is constructed in a Low Voltage DMOS(LVDMOS) process that combines bipolar, CMOS and DMOS devices. DMOS transistors are used in the output stage because of the absence of second breakdown.

3.1 TDA8358J

Features :

- Few external components
- Highly efficient fully DC-coupled vertical bridge output circuit
- Vertical flyback switch with short rise and fall times
- Built-in guard circuit
- Thermal protection circuit
- Improved EMC performance due to differential inputs
- East-west output stage

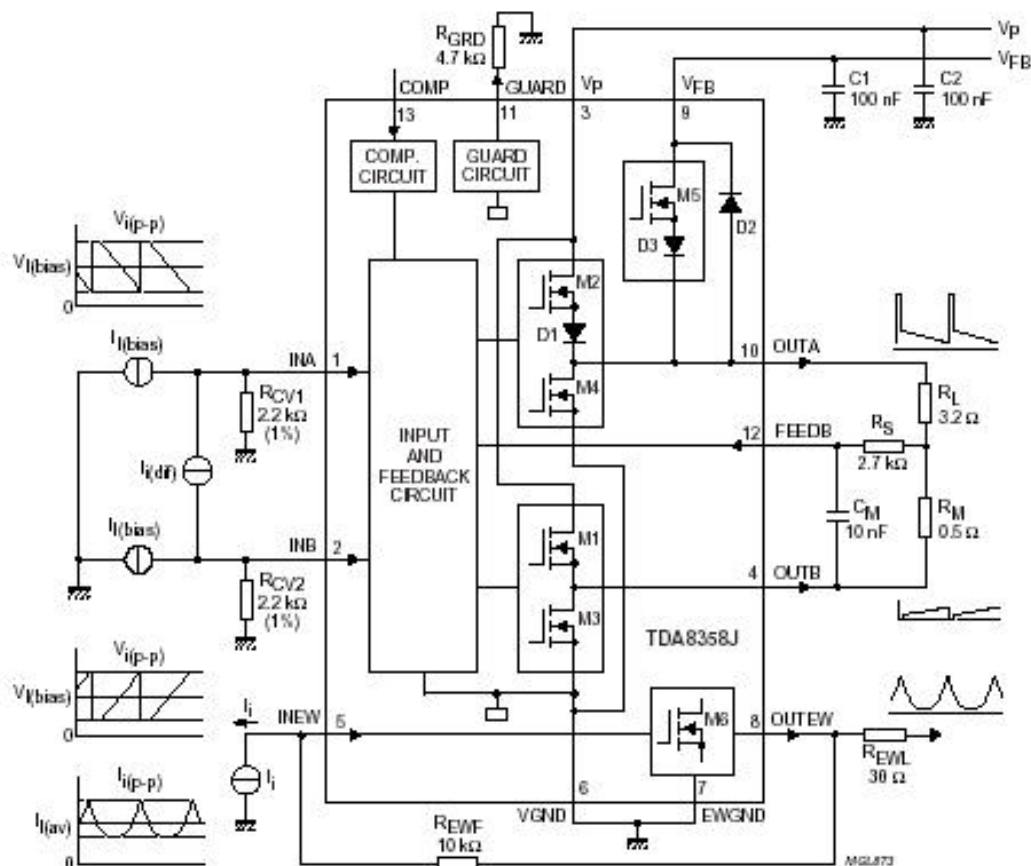


IC DESCRIPTION

3.2 PINNING

Pin	Symbol	Description
1	INA	Positive vertical input
2	INB	Negative vertical input
3	V _P	Supply voltage
4	OUTB	Vertical output voltage B
5	INEW	East-west input voltage
6	VGND	Vertical ground
7	EWGND	East-west ground
8	OUTEW	East-west output voltage
9	V _{FB}	Flyback supply voltage
10	OUTA	Vertical output voltage A
11	GUARD	Guard output voltage
12	FEEDB	Input measuring resistor
13	COMP	Input compensation current

3.3 Block diagram TDA83583



IC DESCRIPTION

4 TDA6107AJF

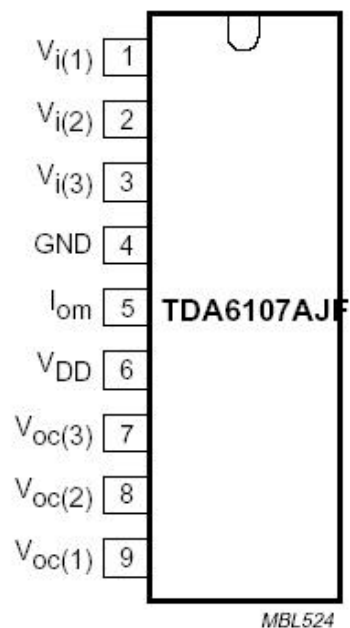
The TDA6107AJF includes three video output amplifiers and is intended to drive the three cathodes of a colour CRT directly. The device is contained in a plastic DIL-bent-SIL 9-pin medium power(DBS9MPF) package, and uses high-voltage DMOS technology. To obtain maximum performance, the amplifier should be used with black-current control.

4.1 Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/ms
- No external components required
- Very simple application
- Single supply voltage of 200V
- Internal reference voltage of 2.5 V
- Fixed gain of 81.
- Black-current stabilisation (BCS) circuit with voltage window from 1.8 to 6 V and current window from 100uA to -10mA
- Thermal protection
- Internal protection against positive flashover discharges appearing on the CRT

4.2 Pin description

Pin	Symbol	Description
1	$V_{i(1)}$	inverting input 1
2	$V_{i(2)}$	inverting input 2
3	$V_{i(3)}$	inverting input 3
4	GND	ground (fin)
5	I_{om}	black current measurement output
6	V_{DD}	supply voltage
7	$V_{OC(3)}$	cathode output 3
8	$V_{OC(2)}$	cathode output 2
9	$V_{OC(1)}$	cathode output 1



IC DESCRIPTION

6 STR - W6756

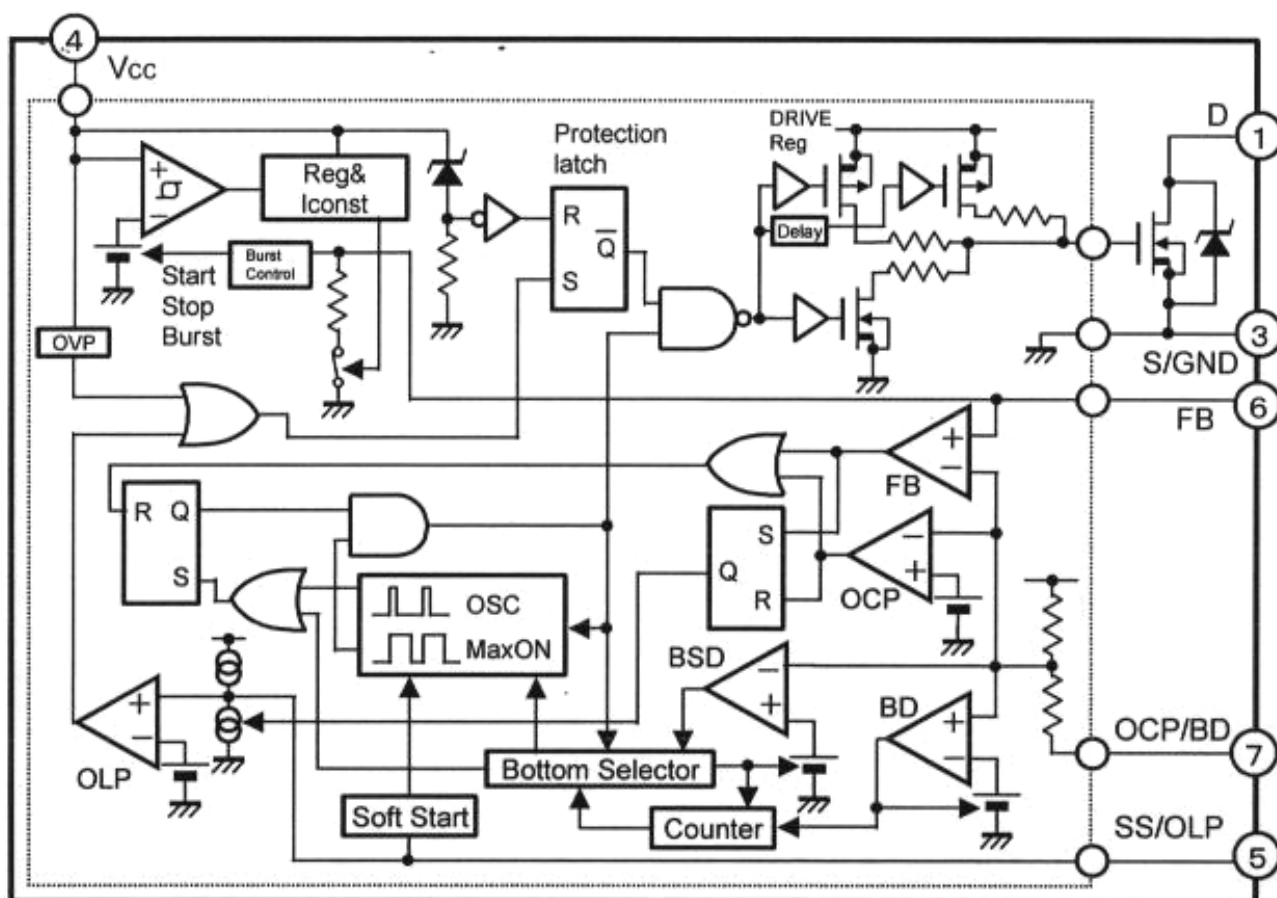
6.1 GENERAL DESCRIPTION

The STR-W6756 is an hybrid IC with a build-in MOSFET (Switching regulators) and control IC, designed for flyback converter type switch mode power supply applications.

6.2 FEATURES

- Small SIP fully isolated moulded 6 pins package
- Many protection functions :
 - Pulse-by-pulse overcurrent protection (OCP)
 - Overvoltage protection with latch mode (OVP)
 - Thermal protection with latch mode (TSD)

6.3 BLOCK DIAGRAM



IC DESCRIPTION

6.4 PIN DESCRIPTION

Terminal No.	Symbols	Descriptions	Functions
1	D	Drain terminal	MOSFET drain
3	S/GND	Source/Ground terminal	MOSFET Source/Ground
4	Vcc	Power supply	Input of power supply for control circuit
5	SS/OLP	Delay at Overload/Soft Start set up Terminal	Overload Protection and Soft Operation Time set up
6	FB	Feedback terminal	Constant Voltage Control Signal Input, Burst(intermittent) mode Oscillation Control
7	OCP/BD	Overcurrent Protection Input /Bottom Detection Terminal	Overcurrent Detection Signal Input /Bottom Detection Signal Input

IC DESCRIPTION

6.5 CONTROL PART-ELECTRICAL CHARACTERISTICS

Parameter	Terminal	Symbol	Ratings			Units
			MIN	TYP	MAX	
Power Supply Start-up Operation						
Operation start voltage	4 - 3	Vcc(ON)	16.3	18.2	19.9	V
Operation stop voltage	4 - 3	Vcc(OFF)	8.8	9.7	10.6	V
Circuit current in operation	4 - 3	Icc(ON)	--	--	6	mA
Circuit current in non-operation	4 - 3	Icc(OFF)	--	--	100	μA
Oscillation Frequency	1 - 3	fosc	19	22	25	kHz
Soft Start Operation Stop Voltage	5 - 3	VSSOLP(SS)	1.1	1.2	1.4	V
Soft Start Operation Charging Current	5 - 3	ISSOLP(SS)	-710	-550	-390	μA
Normal Operation						
Bottom-Skip Operation Threshold Voltage1	7 - 3	VOCPBD(BS1)	-0.720	-0.665	-0.605	V
Bottom-Skip Operation Threshold Voltage2	7 - 3	VOCPBD(BS2)	-0.485	-0.435	-0.385	V
Overcurrent Detection Threshold Voltage	7 - 3	VOCPBD(LIM)	-0.995	-0.940	-0.895	V
OCP/BD Terminal Outflow Current	7 - 3	IocPBD	-250	-100	-40	μA
Quasi-Resonant Operation Threshold Voltage1	7 - 3	VOCPBD(TH1)	0.25	0.40	0.52	V
Quasi-Resonant Operation Threshold Voltage2	7 - 3	VOCPBD(TH2)	0.67	0.80	0.93	V
FB Terminal Threshold Voltage	6 - 3	VFB(OFF)	1.32	1.45	1.58	V
FB Terminal Inflow Current(Normal Operation)	6 - 3	IFB(ON)	600	1000	1400	μA
Stand-by Operation						
Stand-by Operation start Voltage	4 - 3	VCC(S)	10.3	11.1	12.1	V
Stand-by Operation start Voltage Interval	4 - 3	VCC(SK)	1.10	1.35	1.65	V
Stand-by Non-Operation Circuit Current	4 - 3	ICC(S)	--	20	56	μA
FB Terminal Inflow Current(Stand-by)	6 - 3	IFB(S)	--	4	14	μA
Stand-by Operation FB Terminal Threshold Voltage	6 - 3	VFB(S)	0.55	1.10	1.50	V
Minimum ON Time	1 - 3	TON(MIN)	0.65	1.00	1.35	μsec
Protection Operation						
Maximum ON Time	1 - 3	TON(MAX)	27.5	32.5	39.0	μsec
OLP Operation Threshold Voltage	5 - 3	VSSOLP(OLP)	4.0	4.9	5.8	V
OLP Operation Charging Current	5 - 3	ISSOLP(OLP)	-16	-11	-6	μA
OVP Operation Voltage	4 - 3	VCC(OVP)	25.5	27.7	29.9	V
Latch Circuit Holding Current	4 - 3	ICC(H)	--	45	140	μA
Latch Circuit Release Voltage	4 - 3	VCC(La.OFF)	6.0	7.2	8.5	V

7 FUNCTIONAL DESCRIPTION OF VIDEO PROCESSOR

7.1 Vision IF amplifier

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free.

The VCO of the PLL circuit is internal and the frequency is fixed to the required value by using the clock frequency of the TCG u-Controller as a reference. The setting of the various frequencies (e.g. 38, 38.9, 45.75 and 58.75MHz) can be made via the control bits IFA-IFC in subaddress 2FH. Because of the internal VCO the IF circuit has a high immunity to EMC interferences.

The output of the AFC detector can be read from output byte 04H and has a resolution of 7bit(25kHz per step). By means of this information a fast tuning algorithm can be designed.

The IC contains a group delay correction circuit which can be switched between the BG and a uncompensated group delay response characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter. This group delay correction is realised for the demodulated CVBS output signal. The IC contains in addition a sound trap circuit with a switchable centre frequency.

7.2 QSS sound circuit

The sound IF amplifier is similar to the vision IF amplifier and has an external AGC decoupling capacitor.

The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved.

The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in

phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics.

Switching between the QSS output and AM output is made by means of the AM bit in subaddress 33H.

7.3 FM demodulator

The FM demodulator is realised as narrow-band PLL with internal loop filter, which provides the necessary selectivity without using an external band-pass filter. To obtain a good selectivity a linear phase detector and a constant input signal amplitude are required. For this reason the intercarrier signal is internally supplied to the demodulator via a gain controlled amplifier and AGC circuit. To improve the selectivity an internal bandpass filter is connected in front of the PLL circuit.

The nominal frequency of the demodulator is tuned to the required frequency (4.5/5.5/6.0/6.5 MHz) by means of a calibration circuit which uses the clock frequency of the TCG(1)-Controller as a reference. It is also possible to frequencies of 4.72 and 5.74Mhz so that a second sound channel can be demodulated. In the latter application an external bandpass filter has to be

IC DESCRIPTION

applied to obtain sufficient selectivity (the sound input can be activated by means of the setting of CMB2-CMB0 bits in subaddress 4AH). The setting to the wanted frequency is realised by means of the control bits FMA, FMB and FMC in the control bit 33H.

From the output status bytes it can be read whether the PLL frequency is inside or outside the window and whether the PLL is in lock or not. With this information it is possible to make an automatic search system for the incoming sound frequency. This can be realised by means of a software loop which switches the demodulator to the various frequencies and then select the frequency on which a lock condition has been found.

The amplitude deemphasis output signal changed with 6dB by means of the AGN bit. In this way output signal differences between the 4.5 MHz standard (frequency deviation 25 kHz) and the other standards (frequency deviation 50 kHz) can be compensated.

7.4 Audio input selector and volume control

7.4.1 STEREO AND AV STEREO VERSIONS

The audio input selector circuit has 4 external stereo inputs, a stereo output for SCART/CINCH and stereo outputs for headphone and audio power amplifiers. The selection is made with the bits SAS2/0, SO2/0 and HPO2/0. AV stereo versions without Audio DSP have no headphone output. The input signal selection for the volume controlled audio outputs is realised by the HPO2/0 bits.

The gain from an external audio input to each of the (non-controlled) analog output is 0 or +6dB (controlled by the DSG bit). A supply voltage of 5V allows input and output amplitude of 1VRMS full scale, as required to comply with the SCART specification, the audio supply voltage must be 8V. In that case the gain of the audio amplifier must be doubled. This can be realised with the DSG bit in subaddress 32H.

The circuit contains an analogue stereo volume control circuit with a control range of about 70dB.

This volume control circuit is used for the headphone channel (stereo versions with Audio DSP) or for the main channel (AV stereo versions without Audio DSP). The analogue control circuit also contains an Automatic Volume Levelling (AVL) function. When this function is activated it stabilises the audio output signal to a certain level so that big fluctuations of the output power are prevented.

7.4.2 MONO VERSIONS

The audio input selector circuit has 4 inputs for mono signals. The selection is made with the HPO2/0 bits.

The circuit contains an analogue volume control circuit with a control range of about 70dB and an AVL circuit.

7.5 CVBS and Y/C input signal selection

7.5.1 ALL VERSIONS

IC DESCRIPTION

The ICs have 3 inputs for external CVBS signals. All CVBS inputs can be used as Y input for the insertion of Y/C signals. However, the CVBS(Y)2 input has to be combined with the C3 input. It is possible to add an extra CVBS(Y/C) input via the pins which are intended to be used for YUV interface (or RGB/YPrPb input). The selection of this additional CVBS(Y/C) input is made via the YC bit.

The function of the IFVO/SVO/CVBSI pin is determined by the SVO1/SVO0 bits. When used as output a selection can be made between the IF video output signal or the selected CVBS signal (monitor out). This pin can also be used as additional CVBS input. This signal is inserted in front of the group delay / sound trap circuit. It is also possible to use the group delay and sound trap circuit for the CVBS2 signal (via the CV2 bit).

For the CVBS(Y/C) inputs the circuit can detect whether a CVBS or Y/C signal is present on the input. The result can be read from the status register (YCD bit in subaddress 03H) and this information can be used to put the input switch in the right position (by means of the INA-IND bits in subaddress 38H). The Y/C detector is only active for the CVBS(Y)3/C3, CVBS(Y)4/C4 and CVBS(Y)x/Cx inputs. It is not active for the CVBS(Y)2/C3 input.

The video ident circuit can be connected to all video input signals. This ident circuit is independent of the synchronisation and can be used to switch the synchronisation and can be used to switch the presence of a video signal (via the VID bit). In this way a very stable OSD can be realised. The result of the video ident circuit can be read from the output bit SID (subaddress 00).

7.6 Synchronisation circuit

The IC contains separator circuits for the horizontal and vertical sync pulses. To obtain an accurate timing of the displayed picture the input signal of the sync separator is not derived from the various CVBS/Y or RGB/YPrPb inputs but from the YOUT pin. For this reason the YOUT pin must be capacitively coupled to the YSYNC pin. The delay between the various inputs and the YOUT signal can have rather large differences (e.g. comb filter active or not). By choosing the YOUT signal as input signal for the sync separator these delays have no effect on the picture position. Only for RGB signals without sync on green the input of the sync separator has to be connected to one of the CVBS inputs. This selection is made by means of the SYS bit.

The horizontal drive signal is obtained from an internal VCO which is running at a frequency of 25 MHz. This oscillator is stabilised to this frequency by using the clock signal coming from the reference oscillator of the TCG -Controller.

To obtain a stable On-Screen-Display (OSD) under all conditions it is important that the first control loop is switched off or set to low gain when no signal is available at the input. The input signal condition is detected by the video identification circuit. The video identification circuit can automatically switch first control loop to a low gain when no input signal is available. This mode is obtained when the VID bit is set to "0". When the VID bit is "1" the mode of the first control loop can be switched by means of the FOA/FOB or POC bits.

For a good performance during normal TV reception (display of the front-end signal) various connections are active between the vision IF amplifier and the synchronisation circuit (e.g. gating pulses for the AGC detector and noise gating of the sync separator). These connections are not allowed when external video signals are displayed. The switching of these connections can be coupled to the input signal selection bits (INA-IND). This mode is obtained when the VDXEN bit is "0". Due to the input signal selector configuration it is possible that the internal CVBS signal is

IC DESCRIPTION

available on one of the other CVBS inputs. In this condition the connections between the vision IF amplifier and the synchronisation circuit can be switched on and off by means of the VDX bit.

The VDXEN bit must be set to “1” for this mode.

The vertical synchronisation is realised by means of a divider circuit.

7.7 Horizontal and vertical drive

The horizontal drive is switched on and off via the soft start/stop procedure. The soft start function is realised by means of variation of the TON of the horizontal drive pulses. During the soft-stop period the horizontal output frequency is doubled resulting in a reduction of the EHT so that the picture tube capacitance can easily be discharged. In addition the horizontal drive circuit has a ‘low-power start-up’ function.

The vertical ramp generator needs an external resistor and capacitor. For the vertical drive a differential output current is available. The outputs must be DC coupled to the vertical output stage.

The IC has the following geometry control functions:

- > Vertical amplitude
- > Vertical slope
- > S-correction
- > Vertical shift
- > Vertical zoom
- > Vertical scroll
- > Vertical linearity correction. When required the linearity setting for the upper and lower part of the screen can have a different setting.
- > Horizontal shift
- > EW width
- > EW parabola width
- > EW upper and lower corner parabola correction
- > EW trapezium correction
- > Horizontal parallelogram and bow correction.

When the East-West geometry function is not required (e.g. for 90 picture tubes) the EW output pin can be used for the connection of the AVL capacitor. This function is chosen by means of the AVLE bit.

7.8 Chroma, luminance and feature processing

Some versions contain a 4H/2H(2D) adaptive PAL/NTSC comb filter. The comb filter is automatically activated when standard CVBS signals are received. A signal is considered as “standard signal” when a PAL or NTSC signal is identified and when the vertical divider is in the modes ‘standard narrow window’ or ‘standard TV norm’. For non-standard signals and for SECAM signals the comb filter is bypassed and the signal is filtered by means of bandpass and trap filters.

The chroma band-pass and trap circuits (including the SECAM cloche filter) are realised by means of internal filters and are tuned to the right frequency by comparing the tuning frequency with the reference frequency of the colour decoder.

IC DESCRIPTION

The circuit contains the following picture improvement features:

- > Peaking control circuit. The peaking function can be activated for all incoming CVBS, Y/C and RGB/YPrPb signals. Various parameters of the peaking circuit can be adapted by means of the I2C-bus. The main parameters are:
 - Peaking centre frequency (via the PF1/PF0 bits in subaddress 19H).
 - Ratio of positive and negative peaks (via the RPO1/RPO0 bits in subaddress 47H). The peaks in the direction "white" are the positive peaks.
 - Ratio of pre- and aftershoots (via the RPA1/RPA0 bits in subaddress 47H).
- > Video dependent coring in the peaking circuit. The coring can be activated only in the low - light parts of the screen. This effectively reduces noise while having maximum peaking in the bright parts of the picture.
- > Black stretch. This function corrects the black level for incoming signals which have a difference between the black level and the blanking level. The amount of stretching (A-A in Fig. 72) and the minimum required back ground to activate the stretching can be set by means of the I2C-bus (BSD/AAS in subaddress 45H).
- > Gamma control. When this function is active the transfer characteristic of the luminance amplifier is made non-linear. The control curve can be adapted by means of I2C-bus settings (see Fig. 74). It is possible to make the gamma control function dependent on the picture content (Average Picture Level, APL). The effect is illustrated in Fig. 75. Previously this function was mentioned under the name "white stretch function".
- > Blue-stretch. This circuit is intended to shift colour near 'white' with sufficient contrast values towards more blue to obtain a brighter impression of the picture.
- > Dynamic skin tone (flesh) control. This function is realised in the YUV domain by detecting the colours near to the skin tone.

7.9 Colour decoder

The ICs decode PAL, NTSC and SECAM signals. The PAL/NTSC decoder does not need external reference crystals but has an internal clock generator which is stabilised to the required frequency by using the clock signal from the reference oscillator of the TCG u -Controller.

Under bad-signal conditions (e.g. VCR-playback n feature mode), it may occur that the colour killer is activated although the colour PLL is still in lock. When this killing action is not wanted it is possible to overrule the colour killer by forcing the colour decoder to the required standard and to activate the FCO-bit (Forced Colour On) in subaddress 3CH. The sensitivity of the colour decoder for PAL and NTSC can be increased by means of the setting of the CHSE1/CHSE0 bits in subaddress 3CH.

The Automatic Colour Limiting (ACL) circuit (switchable via the ACL bit in subaddress 3BH) prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received. The ACL circuit is designed such that it only reduces the chroma signal and not the burst signal. This has the advantage that the colour sensitivity is not affected by this function.

The SECAM decoder contains an auto-calibrating PLL demodulator which has two references, viz: the divided reference frequency (obtained from the-Controller) which is used to tune the PLL to the desired free-running frequency and the bandgap reference to obtain the correct absolute value of the output signal. The VCO of the PLL is calibrated during each vertical blanking period, when the IC is in search or SECAM mode. The frequency offset of the B-Y demodulator can be reduced by means of the SBO1/SBO0 bits in subaddress 3CH.

IC DESCRIPTION

The base-band delay line is integrated. In devices without CVBS comb filter this delay line is also active during NTSC to obtain a good suppression of cross colour effects. The demodulated colour difference signals are internally supplied to the delay line. The baseband comb filter can be switched off by means of the BPS bit (subaddress 3CH).

The subcarrier output is combined with a 3-level output switch (0 V, 2.1 V and 4.5 V). The output level and the availability of the subcarrier signal is controlled by the CMB2-CMB0 bits.

7.10 RGB output circuit

In the RGB control circuit the signal is controlled on contrast, brightness and saturation. The IC has a YUV interface so that additional picture improvement ICs can be applied. To compensate signal delays in the external YUV path the clamp pulse in the control circuit can be shifted by means of the CLD bit in subaddress 44H. When the YUV interface is not required some of the pins can be used for the insertion of RGB/YPrPb signals or as additional CVBS(Y)/C input. When the YUV interface is not used one of the pins (VOUT) is transferred to general purpose output switch (SWO1). The IC has also a YUV interface to the digital. Via this loop digital features like "double window" are added.

A tint control is available for the base-band U/V signals. For this reason this tint control can be activated for all colour standards. The signals for OSD and text are internally supplied to the control circuit. The output signal has an amplitude of about 1.2V black-to-white at nominal input signals and nominal settings of the various controls.

A black level off-set can be made with respect to the level which is generated by the black current stabilization system. In this way different colour temperatures can be obtained for the bright and the dark part of the picture. The black level control is active on the Red and the Green output signal. It is also possible to control the black level of the Blue and the Green output signal (OFB bit = 1).

In the Vg2 adjustment mode (AVG=1) the black current stabilization system checks the output level of the 3 channels and indicates whether the black level of the highest output is in a certain window(WBC-bit) or below or above this window (HBC-bit). This indication can be read from the status byte 01 and can be used for automatic adjustment of the Vg2 voltage during the production of the TV receiver. During this test the vertical scan remains active so that the indication of the 2 bits can be made visible on the TV screen.

The control circuit contains a beam current limiting circuit and a peak white limiting circuit. The control is realised by means of a reduction of the contrast and brightness control settings. The way of control (first contrast and then brightness or contrast and brightness in parallel) can be chosen by means of the CBS bit (subaddress 44H). The peak white level is adjustable via the I2C-bus.

To prevent that the peak white limiting circuit reacts on the high frequency content of the video signal a low-passfilter is inserted in front of the peak detector. The circuit also contains a soft-clipper which prevents that the high frequency peaks in the output signal become too high. The difference between the peak white limiting level and the soft clipping level is adjustable via the I2C-bus in a few steps.

During switch-off of the TV receiver a fixed beam current is generated by the black current control circuit. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection can be placed in an overscan position so that the discharge is not visible on the screen.

A wide blanking pulse can be activated in the RGB outputs by means of the HBL bit in subaddress 43H. The timing of this blanking can be adjusted by means of the bits WBF/R bits in subaddress 26H.

IC DESCRIPTION

8 GENERAL DESCRIPTION OF THE TV SOUND OF SOUND PROCESSOR

The TV Sound Processor is a digital TV sound processor for analog multi-channel sound systems in TV sets. It is based on a 24 bit DSP and designed to support several applications.

A new easy-to-use control concept was implemented for easiest configuration programming of the very complex functionality of the TV Sound Processor. Pre-defined setups are available for all implemented sound processing modes. A loud speaker switching concept allows it to adapt the pre-defined setups to the specific loudspeaker application. The built-in intelligence for pre-defined standards and Auto Standard Detection (ASD) allows an easy setup of the demodulator and decoder part.

The control concept for the audio processor is based on the following new features:

- > Pre-defined setups for the sound processing modes like Dolby® Pro Logic® and Virtual Dolby® Surround (422, 423)
- > Flexible configuration of audio outputs to the loudspeaker configuration with an additional output crossbar
- > Master volume function

The control concept for the demodulator and decoder (DEMDEC) is based on the following new features:

- > Easy demodulator setup for all implemented standards with Demodulator and Decoder Easy Programming (DDEP) for a pre-selected standard or combined with Auto Standard Detection (ASD) for automatic detection of a transmitted standard

Other features of the DEMDEC are:

- > M/BTSC and N standards supported
- > M/Japan (EIAJ) supported
- > FM Radio stereo decoding
- > Alignment-free, fully digital system
- > For BTSC full dbx® performance
- > SAP demodulation (without dbx®) simultaneously with stereo decoding, or mono plus SAP with dbx®
- > Line/pilot frequency selectable from 15.734 kHz and 15.625 kHz (or automatic detection / auto search)
- > High selectivity for pilot detection, high robustness against high-frequency audio components
- > Pilot lock indicator
- > SAP detector
- > Separate noise detectors for stereo and SAP with adjustable threshold levels, hysteresis, and automute function.

An overview of the supported standards and sound systems and their key parameters is given in the following tables.

The analog multi-channel sound systems (A2, A2+ and A2*) are sometimes also named 2CS (2 carrier systems).

IC DESCRIPTION

ANALOG 2-CARRIER SYSTEMS

[Table] Frequency modulation

STANDARD	SOUND SYSTEM	CARRIER FREQUENCY (MHz)	FM DEVIATION(kHz) NOM./MAX./OVER			BANDWIDTH/ DE-EMPHASIS (kHz/us)
				SC1	SC2	
M	Mono	4.5	15/25/50	Mono	-	15/75
M	A2+	4.5/4.724	15/25/50	1/2(L+R)	1/2(L+R)	15/75(Korea)
B/G	A2	5.5/5.742	27/50/80	1/2(L+R)	R	15/50
I	Mono	6.0	27/50/80	mono	-	15/50
D/K(1)	A2*	6.5/6.258	27/50/80	1/2(L+R)	R	15/50
D/K(2)	A2*	6.5/6.742	27/50/80	1/2(L+R)	R	15/50
D/K(3)	A2*	6.5/5.742	27/50/80	1/2(L+R)	R	15/50

[Table] Identification for A2 systems

PARAMETER	A2/A2*	A2+ (KOREA)
Pilot frequency	54.6875kHz = 3.5 x line freq.	55.0699 kHz = 3.5 x line freq.
Stereo identification frequency	117.5 Hz = line freq / 133	149.9 Hz = line freq / 105
Dual identification frequency	274.1 Hz = line freq / 57	276.0 Hz = line freq / 57
AM modulation depth	50%	50%

2-CARRIERSYSTEMSWITHNICAM

[Table] NICAM standards

STANDARD	FREQUENCY (MHz)	TYPE	MODULATION		SC2 (MHz) NICAM	DE-EMPHASIS	ROLL-OFF (%)	NICAM CODING
			INDEX(%) NOM./MAX.	DEVIATION (kHz) NOM./MAX. /OVER				
B/G	5.5	FM	-	27/50/80	5.85	J17	40	Note1
I	6.0	FM	-	27/50/80	6.552	J17	100	Note1
D/K	6.5	FM	-	27/50/80	5.85	J17	40	Note1
L	6.5	AM	54/100	-	5.85	J17	40	Note1

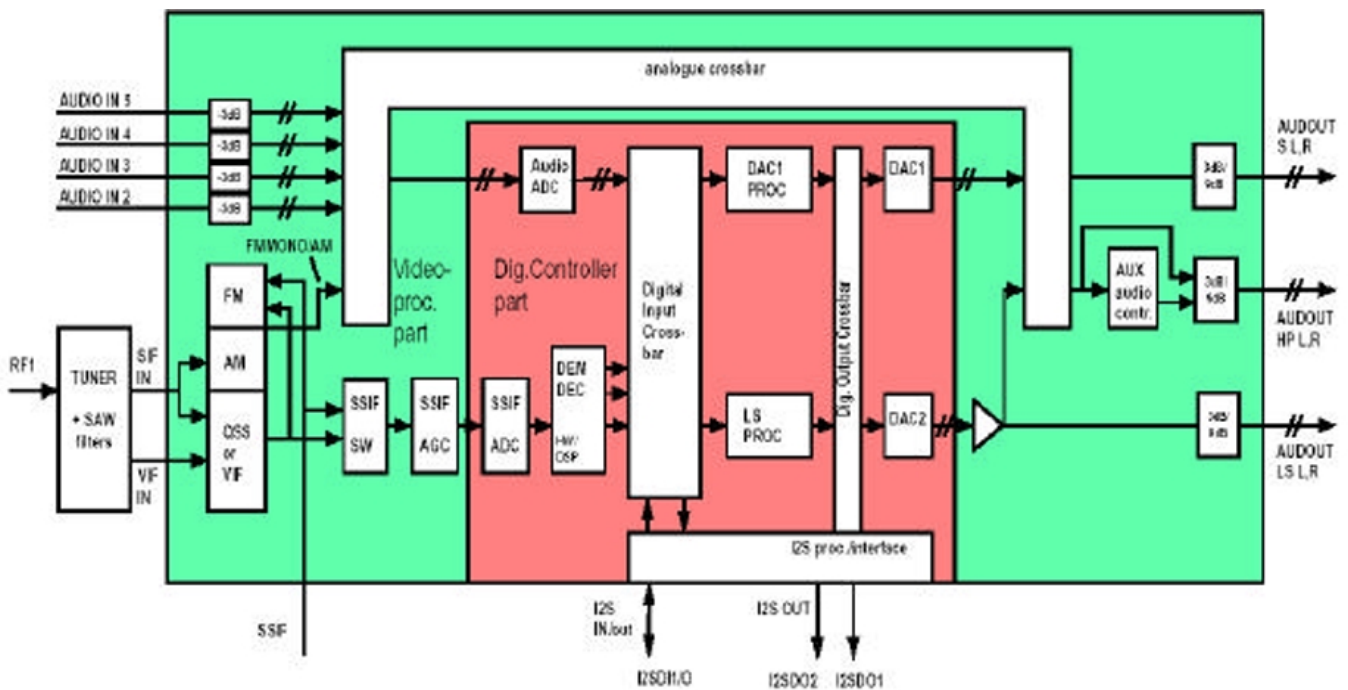
Note 1. See 'EBU specification' or equivalent specification.

9 FUNCTIONAL DESCRIPTION SOUND PROCESSOR

9.1 The UOC III TV Sound Concept

The UOCIII sound concept is implemented over the video processor and TCG-microcontroller. Only relevant blocks, functions and signal flows for sound are given.

IC DESCRIPTION



(only relevant blocks, functions and signal flow for sound are shown)

The tuner receives a RF signal and converts it to IF. Via appropriate SAW filters the SIF signal is delivered to the QSS stage of the video processor and if channels according to standard L/L' are received also to the AM demodulator. The Quasi Split Sound demodulation generates the SSIF or intercarrier signal. By the SSIF switch it is possible to choose between the internally derived intercarrier and an external second SIF (2NDSIFEXT), e.g. an intercarrier coming from a PIP frontend. In other applications a 10.7MHz radio IF or satellite FM may be connected to this input. The selected SSIF passes some anti alias filtering, is amplified in an AGC amplifier (SSIF AGC) and is then converted from analogue to digital (SSIF ADC).

The audio signal out of the AM demodulator is connected to the analogue crossbar at the video processor. All other inputs to this multiplexer/audio switch come from external, either from a PIP frontend or SCART/CINCH (AUDINx) or the DAC output signals from the digital controller. The audio AD converters are digitising the audio signals foreseen for further digital processing. One stereo output (AUDOUTS) is available for connections to SCART/CINCH sockets.

The sound part on the digital controller consists of the demodulator/decoder (DEMDEC), a digital input crossbar, the digital audio processing for the loudspeaker and DAC channels, the I2S processing and interfacing, a digital output crossbar as well as the DA conversion.

An auxiliary audio control (volume control, AUX audio contr.) is available on the video processor.

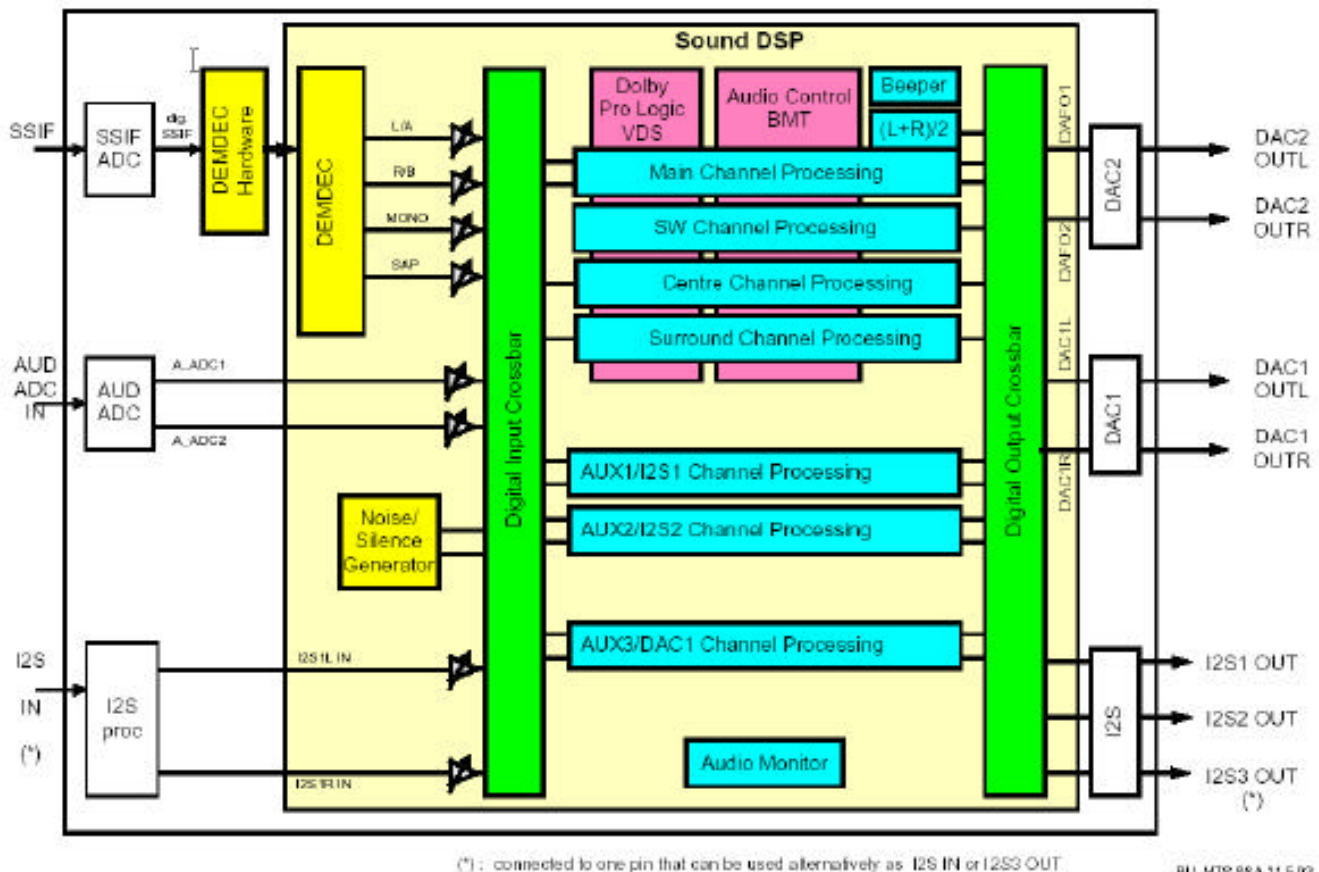
Here it is applied to the headphone channel.

The part of the concept located in the digital controller will be described in the next chapters.

IC DESCRIPTION

9.2 Functional Overview Of the digital controller sound part

The digital controller sound part consists of the SSIFADC, audio ADCs, DEMDEC HW, the sound DSP core, audio DACs and I2S interface hardware as shown in fig below. The DEMDEC part of the Sound DSP is used for the decoder and partly demodulator tasks. The AUDIO part provides the sound features, from the level adjust unit up to the output crossbar. Audio DACs and I2S hardware are converting the processed signals to analogue or digital audio.



The SSIF signal is applied to the SSIF ADC for conversion and is then fed to the DEMDEC hardware processing mainly for demodulation but also some decoding tasks. Remaining decoding is done in the DEMDEC block of the Sound DSP. The DEMDEC processing will be described in the next chapter.

The audio signals (AUD ADC IN) from the analogue crossbar pass the audio ADC and are fed directly into the AUDIO part of the Sound DSP like the I2S signals, which is coming from I2S processing hardware. After level adjust all signals from the DEMDEC and the I2S input are available at the digital input crossbar. A special input is provided for the Noise/Silence Generator needed for Dolby® Pro Logic® processing.

In standard TV applications the main channel signal(L,R) will be connected to the DAC2 for reproduction at the speakers. With multichannel signals centre, surround or subwoofer channels may be passed to the I2S outputs where external DACs may be applied. By this it is possible to build Dolby Normal/Wide, Dolby Phantom Centre or Dolby 3 Stereo set-ups and also a VDS423 application.

9.3 Demodulator and decoder

INTRODUCTION

The TV sound processor provides an easy-to-use programming interface and built-in intelligence for the demodulator and decoder part.

The sound demodulator is able to search for sound carriers and react to transmission mode changes autonomously, without interaction of the micro controller software.

It is possible for a typical terrestrial TV application to setup the entire demodulator with transmission of few control words.

The control interface still allows access to every detail, called demodulator expert mode, for special applications such as satellite TV, more elaborated search algorithms etc.

The new TV Sound Processor Demodulator and Decoder Easy Programming(DDEP) interface provides three possible approaches to setup the demodulator and decoder parts:

- > Auto Standard Detection (ASD)
- > Static Standard Selection (SSS)
- > Demodulator and Decoder Expert Mode (DDXM)

MIXER

The digitized 2nd SIF input signal is fed to the mixers, which mix one or both input sound carriers down to zero IF. The mixer frequency is derived by the standard setting (Easy Programming) or in the Demodulator and Decoder Expert Mode (DDXM) by a 24-bit control word for each carrier.

For NICAM demodulation, a feedback signal is added to the control word of the second carrier mixer to establish a carrier-frequency loop.

FM AND AM DEMODULATION

An FM or AM input signal is fed via a band-limiting filter to a one of two demodulators that can be used for either FM or AM demodulation. Four filters with different bandwidth are available. The output signal of the first demodulator can be used for further demodulation of multiplex signals used in the BTSC, EIAJ and FM Radio standards.

FM IDENTIFICATION

The identification of the FM sound mode is performed by AM synchronous demodulation of the pilot signal and narrow-band detection of the identification frequencies. The result is available via the control bus interface. A selection can be made for three different modes that represent different trade-offs between speed and reliability of identification. The mode is set by DDEP (for FM two-carrier standards) or via expert mode. DDEP also performs automatic FM de-matrix control in dependence on the identification.

FM/AM DECODING

A high-pass filter suppresses DC offsets from the FM/AM demodulators due to carrier frequency offsets and supplies the monitor/peak function with DC values and an un-filtered signal, e.g. for the purpose of carrier detection.

The audio bandwidth is approx. 15 kHz.

The de-emphasis function offers fixed settings for the supported standards (50s, 60s, 75s and J17).

IC DESCRIPTION

A matrix performs the de-matrixing of the A2 stereo, dual and mono signals to obtain the left (L) and right (R) or language A and B signals.

FM PILOT CARRIER PRESENT DETECTOR

The TV Sound Processor provides FM A2 standard pilot carrier detection.

NICAM DEMODULATION

The NICAM signal is transmitted via DQPSK modulation at a bit rate of 728kBit/s. The NICAM demodulator performs DQPSK demodulation and feeds the resulting bit stream and clock signal to the NICAM decoder.

A timing loop controls the sample rate conversion circuitry to lock the sampling rate to the symbol timing of the NICAM data.

NICAM DECODER

The NICAM decoder performs all decoding functions in accordance with the EBU NICAM 728 specification. After locking to the frame alignment word, the data is de-scrambled by applying the defined pseudo-random binary sequence; the NICAM decoder will then synchronize to the periodic frame flag bit C0.

The status of the NICAM decoder can be read out from the NICAM status register by the user (see the control-bus register description). The OSB bit indicates that the decoder has locked to the NICAM data. The VDSP bit indicates that the decoder has locked to the NICAM data and that the data is valid sound data. The C4 bit indicates that the sound conveyed by the FM mono channel is identical to the sound conveyed by the NICAM channel. The error byte contains the number of sound sample errors, resulting from parity checking, that occurred in the past 128ms period. The Bit Error Rate (BER) can be calculated using the following equation;

$$\text{BER} = \frac{\text{bit errors}}{\text{total bits}} = \text{error byte} \times 1.74 \times 10^{-5}$$

During NICAM mode a switchable J17 de-emphasis is supplied.

IC DESCRIPTION

NICAM AUTO-MUTE

If the Auto Standard Detection (ASD) or the Static Standard Detection (SSS) feature is activated the following auto mute function is in effect.

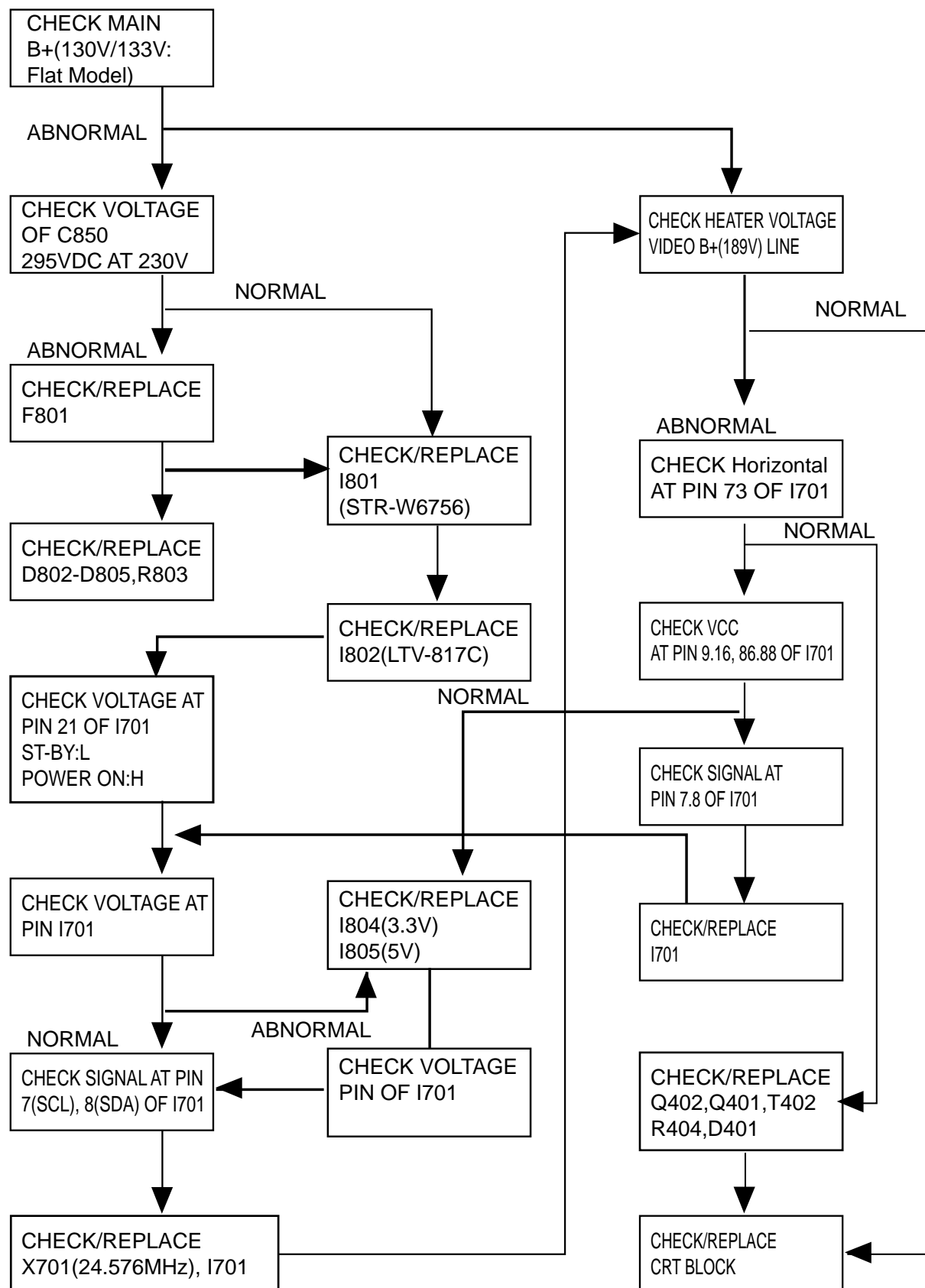
If NICAM B/G, I, D/K is received, the auto-mute is enabled and the signal quality becomes poor, the built-in control automatically switches the output signal (DEC output) to FM channel 1. The automatic switching depends on the NICAM bit error rate. The auto-mute function can be disabled via the control bus.

This function is enabled by setting bit NIC_AMUTE to 0. Upper and lower error limits may be defined by writing appropriate values to the corresponding control bits (NICLOERRLIM and NICUPERRLIM). When the number of errors in a 128 ms period exceeds the upper error limit the auto-mute function will switch the output sound from NICAM to what ever sound is on the first sound carrier(FM or AM). When the error count is smaller than the lower error limit the NICAM sound is restored.

The auto-mute function can be disabled by setting bit NIC_AMUTE to 1. In this condition clicks become audible when the error count increases; the user will hear a signal of degrading quality. For NICAM L applications, it is recommended to demodulate AM sound in the first sound IF. The demodulated AM is provided by the internal IF processor. For applications with external IF processing the external demodulated AM signal can be connected to the SCART/Mono input of the TV Sound Processor. By setting the EXTAM bit, the auto-mute function will switch to the audio ADC input signal named EXTAM instead of switching to the first sound carrier. The ADC source selector should be set to internal AM mono signal or to the external SCART/mono input, where the AM sound signal should be connected.

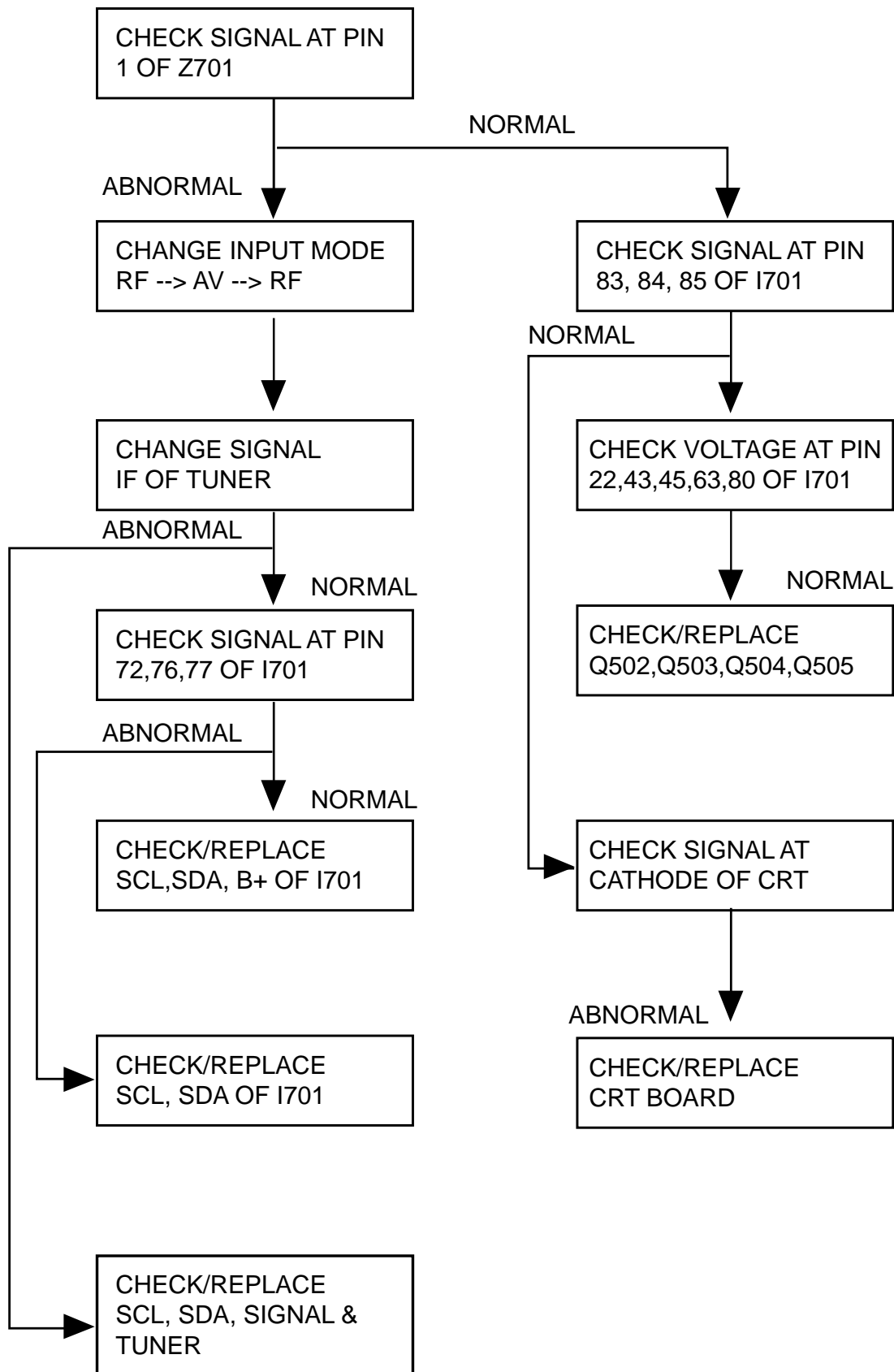
12. TROUBLE SHOOTING CHARTS

1. NO RASTER



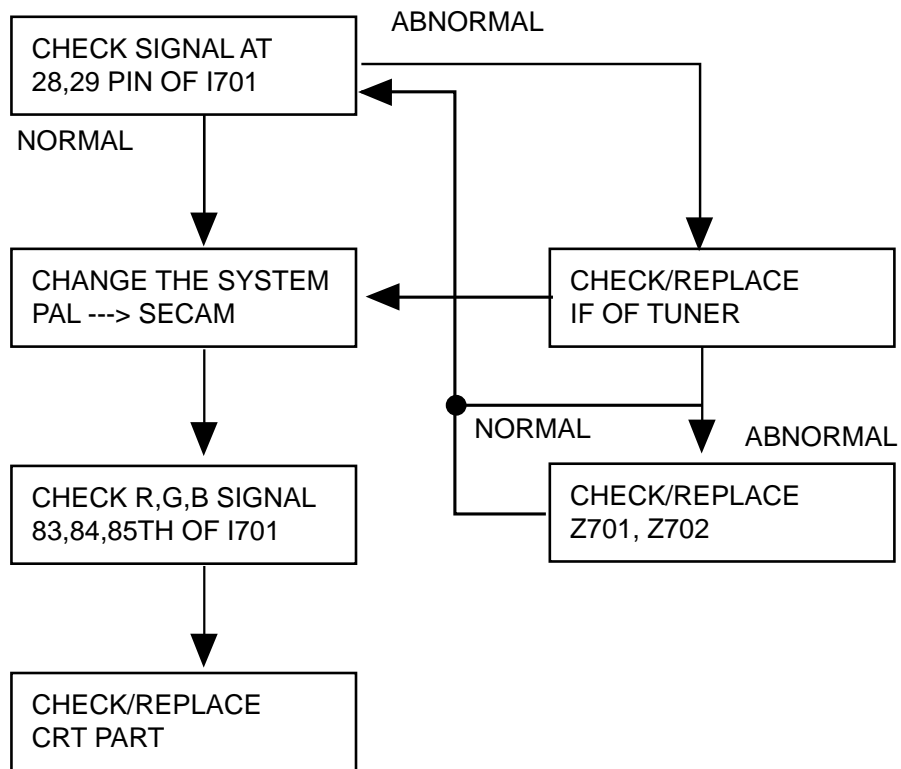
TROUBLE SHOOTING CHARTS

2. NO PICTURE(RASTER OK)



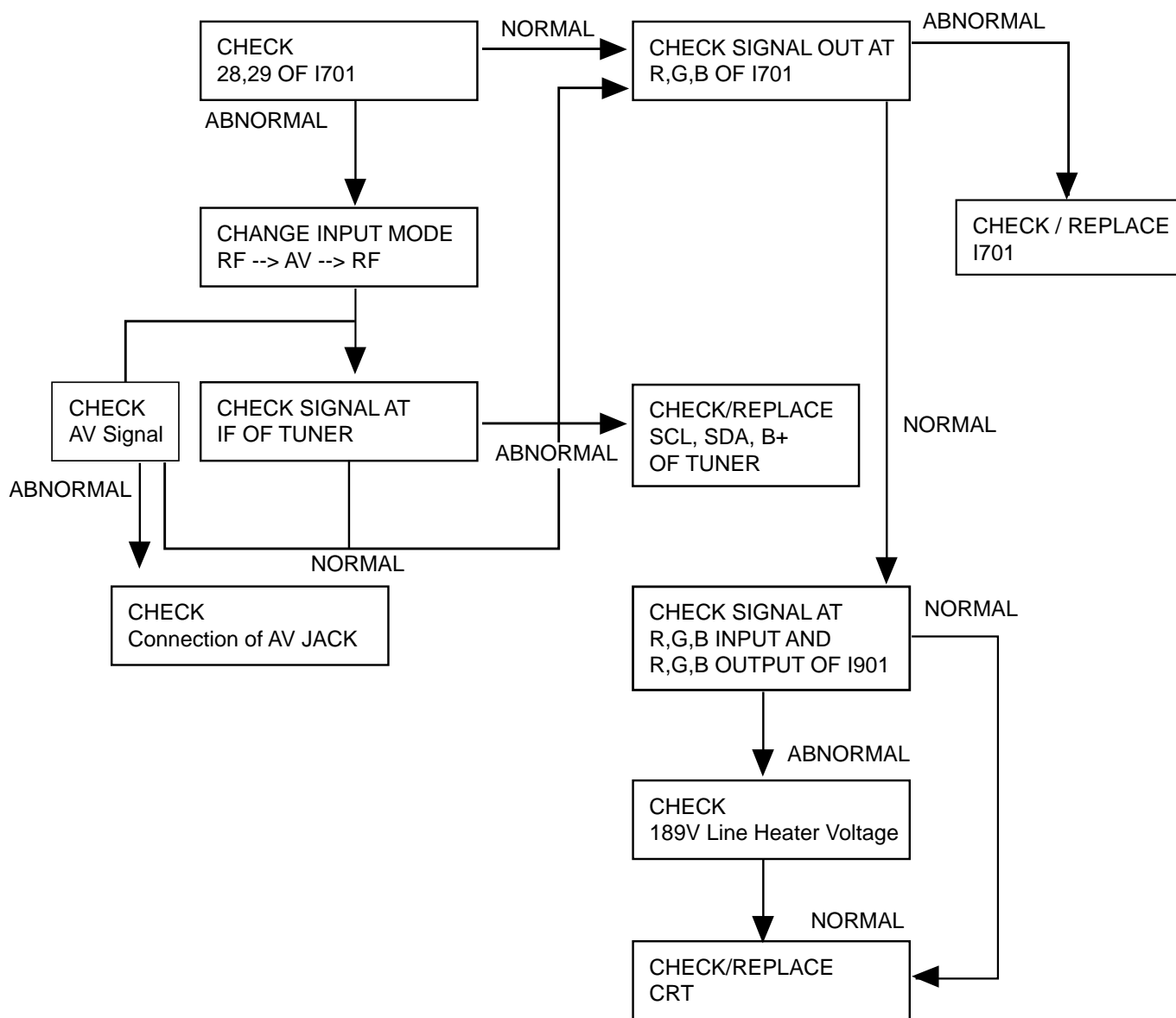
TROUBLE SHOOTING CHARTS

3. NO COLOR



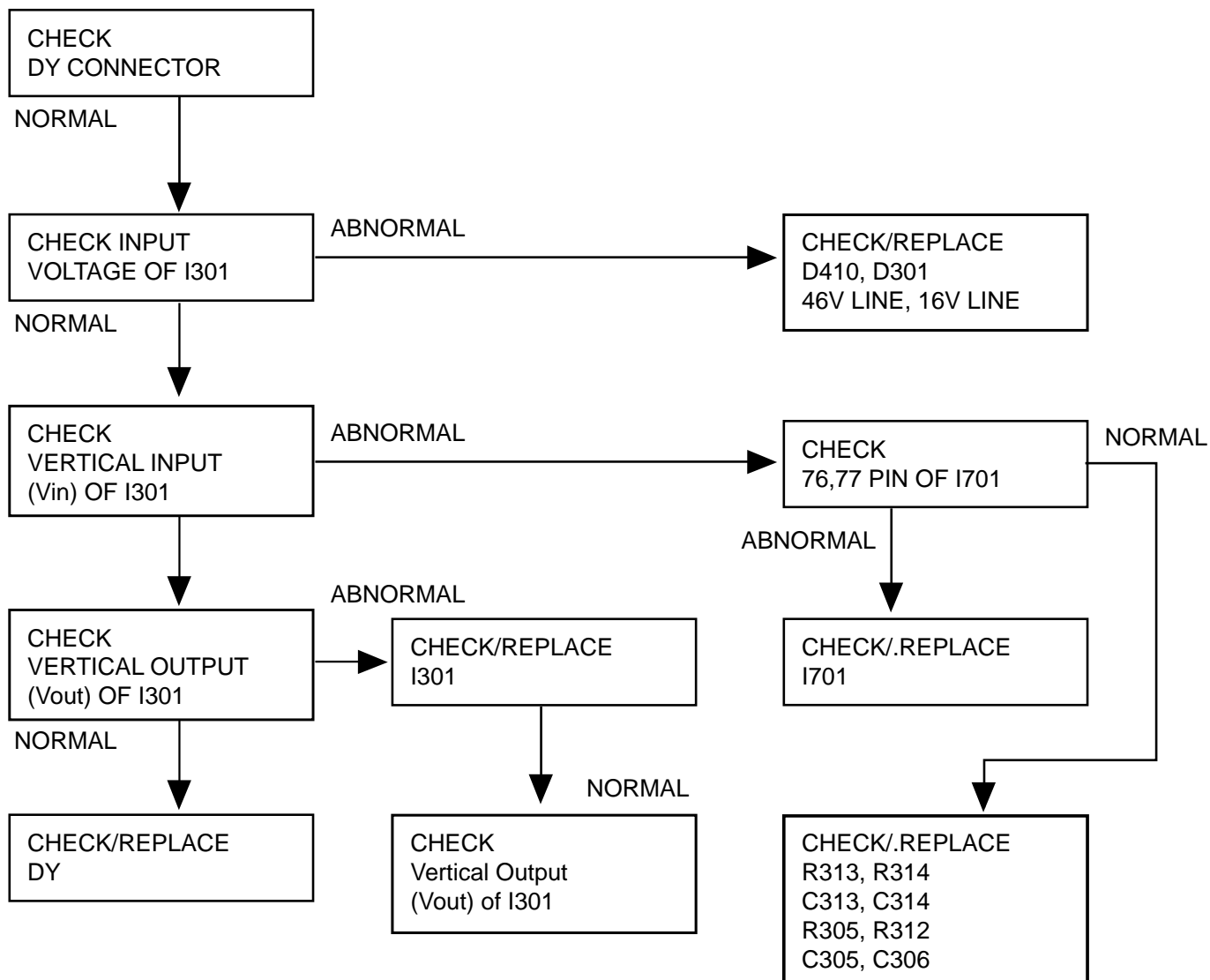
TROUBLE SHOOTING CHARTS

4. NO PICTURE



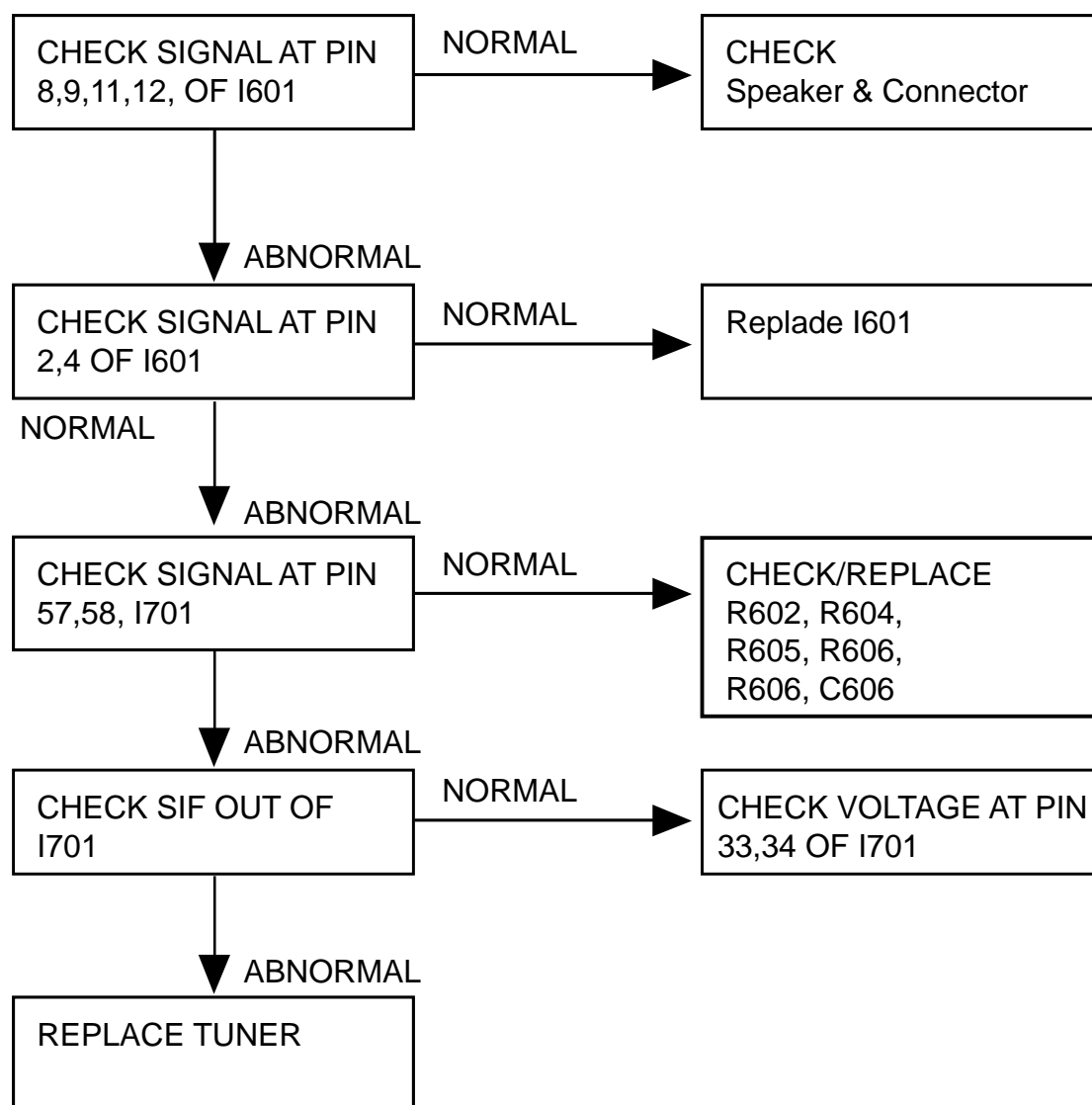
TROUBLE SHOOTING CHARTS

5. NO VERTICAL SCANNING(ONE HORIZONTAL LINE RASTER)



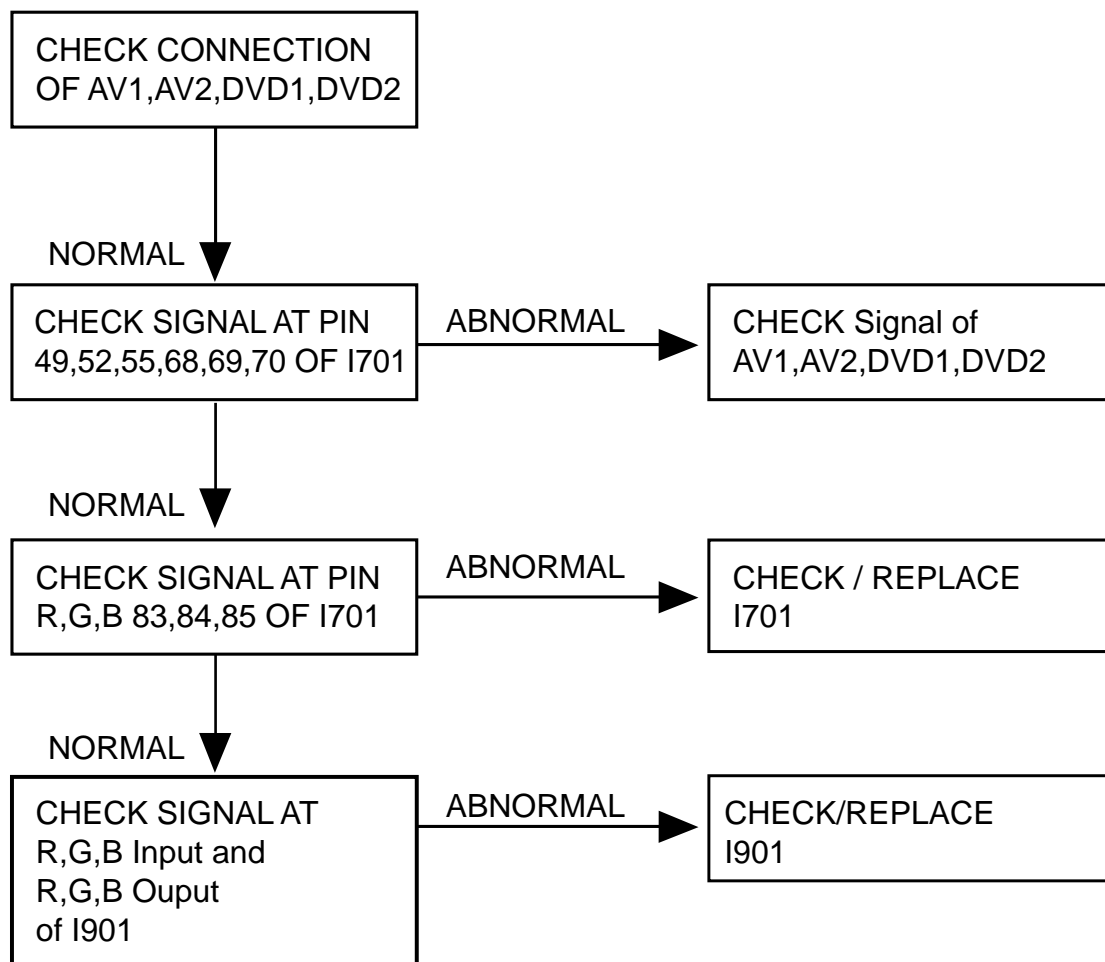
TROUBLE SHOOTING CHARTS

6. NO MAN SOUND(RF)



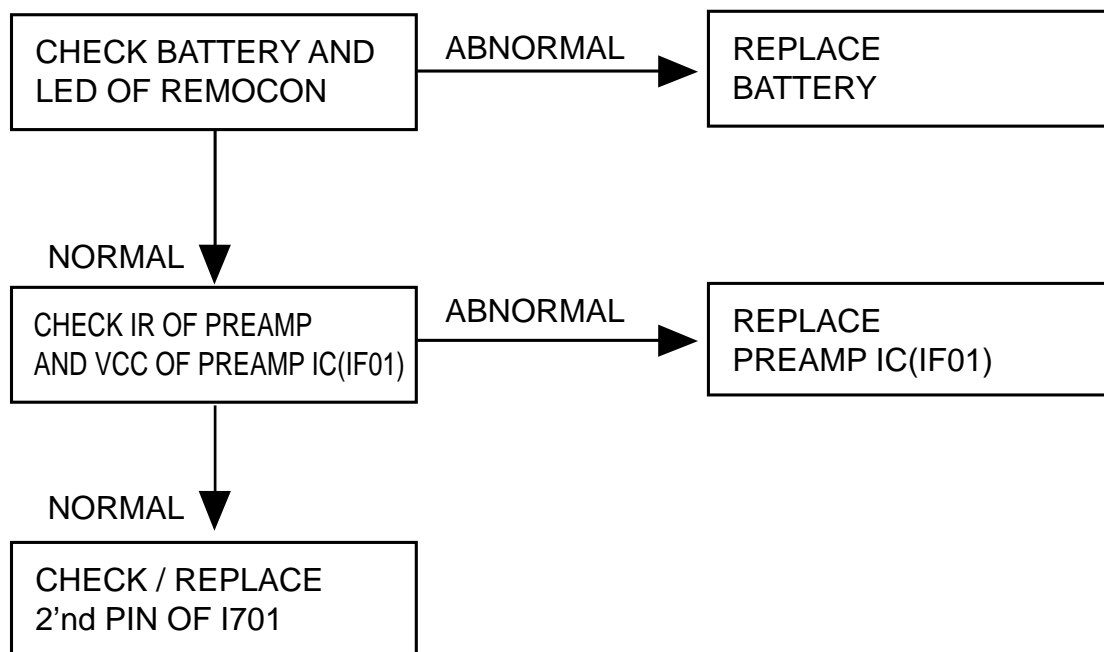
TROUBLE SHOOTING CHARTS

7. NO EXTERNAL AV(RF OK)



TROUBLE SHOOTING CHARTS

8. REMOTE CONTROL UNIT TROUBLE





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